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THE VESTIBULAR APPARATUS AND THE CENTRAL NERVOUS SYSTEM.*

BY DOCENT DR. ROBERT BARANY, VIENNA.

Since the autumn of 1909, I have shown in many demonstrations and discourses the relation of the vestibular apparatus to the brain and spinal cord and especially to the cerebellum, and the methods of examination. These discourses and demonstrations were made in many places, e. g., Budapest International Otological Congress, Psychiatrico-Neurological Society of Vienna, Austrian Otological Society of Vienna, Physicians Society of Vienna, Society for Internal Medicine, British Medical Association, London, Physicians Society, Stockholm, German Otological Society, Frankfort, and various clinics in Berlin, London, Stockholm, Copenhagen and Frankfort. In spite of my endeavors in this manner to make known as widely as possible my methods of examination and their results, and to stimulate similar tests, up to the present time but isolated confirmations and no refutations of my statements have reached me. Thus docent Orczekowsky, Lemburg, and docent Tetens Hald, Copenhagen, have placed at my disposal the history of a case in which the diagnosis of cerebellar tumor was afterwards confirmed by operation as well as by post-mortem examination, in which they made a test of the pointing reaction and in which they confirmed my statements at the congress of Norwegian otologists. Tetens Hald will report this case as well as a case of cerebellar abscess,

*From the Urbantschitisch Ear Clinic, University of Vienna. Read before the meeting of the German Neurological Society, Frankfort, a. M., October 3, 1911. Translated with the author's approval by L. T. De Swarte, M. D., Milwaukee.

and Dr. Bowie will speak about this new method of examination, having seen pathological cases at Prof. Henchen's clinic.

Among the Germans only Prof. Rothman, in the discussion of the paper by Hertzfeld and Kobrak at the Society of Physicians of Berlin, and Prof. Wallenberg casually during the session of the German Neurological Society last year, have expressed themselves as agreeing with my statements, not to mention the expressions of agreement given me personally. Besides these no confirmation or refutation of my statements have reached me. In seeking the cause for the small number of otological and neurological participants in the noteworthy discoveries, I think I find it in the following:

1. The scarcity of the materials: It is easy to understand that there are not many cases of cerebellar tumor, abscess, softening, etc., nevertheless during one year, I have seen more than thirty cases of undoubted cerebellar disease, and a very much greater number in which I found disturbed cerebellar reaction without being able to make a positive diagnosis, yet I see but a limited amount of material. I am sure that in the neurological ambulatoriums, many cases of headache would show cerebellar disturbances if suitably examined.

2. Perhaps sentiment may play a role: Neurologists experience a certain jealousy that an otologist should force his way into their domain; the otologists on the other hand consider the work in this realm as a step in a foreign field. Perhaps I may appease the neurologist, when I say that I have been very close to neurology and as assistant in the psychiatric clinic in Freiburg i. B. have spent a year exclusively in neurology and psychiatry, yet it cannot be denied that we have to do here with the border-ground between otology and neurology. To make further study fruitful, both the otologist and the neurologist will have to learn the new discoveries. Unfortunately it is not easy to acquire the necessary dexterity with the methods of vestibular apparatus examinations to work out isolated complex conditions and use them clinically. It is doubtless true that the vestibular apparatus presents such a complex mechanism, that I myself, after years of study, am prepared for surprises, and I am often filled with wonder both because of its precision and of its sensitiveness. It is self-evident that it is not very easy to delve into the complex vestibular mechanism, since hardly anything was known about it until recently. I give twenty hour courses at the clinic of my chief, Prof. Urbantschitsch, in Vienna, dealing exclusively with this subject, and am of the opinion that it is worthy of at least six weeks of intensive and exclusive study, as well as a

thorough testing on oneself and suitable patients, so that all the phenomena presented may be seen by personal observation, and learned by personal experience. Not only is close study and application necessary, but one must have learned the methods of testing so thoroughly that one can rely upon the results. No one at the present time would consider it superfluous to examine the tendon reflexes or pupil reactions. The testing of the vestibular reactions as also the reaction movements demands a great many technicalities, that one can scarcely describe in writing, but must be seen and tried by oneself to make them correctly. And only when all investigate in the same way will the various results be comparable. All the manifold movements that the investigator must make, must be so much a part of himself that he need not think how to make them, but only to direct his entire attention upon the patient.

I wish now to report certain advances made since the convention of the German Otological Society in Frankfort in June of this year. In October, 1910, Prof. Trendelenburg demonstrated on animals, a painless method of temporarily inhibiting functions of the cerebral cortex by cooling. My attention was called to this method, by Docent Dr. Kolmer, and on his suggestion I have used these temporary coolings to locate certain centers in the cerebellum. I chose for this purpose, persons who, as a result of a cerebellar operation, had only a covering of dura and thin skin, and showed distinct brain pulsations. In many attempts I found that a thick skin, sear-tissue or granulations did not allow the necessary cooling of the cerebellum. Therefore, to cool the cerebellum after other methods failed, I have used the method of freezing the special skin area with ethy-chloride. The spray must be used for two or three minutes, and the effect lasts likewise two or three minutes. No bad after-effects were noted. The patients experience no uncomfortable sensations except a slight pain due to the cooling. One patient who had suffered from headaches said that he had a slight headache the next day but a real relation between the cooling and headache could not be noted. On one patient I repeated the test about a dozen times without changing the cerebellar reaction to stimuli, except during the test. I believe, therefore, to have given proof that this modified Trendelenburg cooling experiment can be considered an entirely harmless method of examination as far as the cerebellum is concerned. I think that the neurologist and psychiatrist can use this experiment with a clear conscience to enlighten us on the cortical function of the cerebellum, and that we still have great and important discoveries awaiting our disclosures.

By examinations of sick people in Vienna, and one patient of Prof. Voss' in Frankfurt a. M., I have given proofs that just back of the attachment of the external ear in the cerebellar cortex, the center for movements of the arm from the shoulder-joint has its location. When I cooled this place the patient pointed spontaneously outward with the arm of the same side. And now by producing a turning nystagmus to the cooled side the normal pointing reaction to the inside failed. This spontaneous pointing error outward was therefore produced not by stimulation of the center for pointing outward but by a paralysis of the antagonistic center for pointing inward. In an analogous way I have located the center for outward movements of the arm. By cooling the cerebellar region five centimeters back of the attachment of the external ear, I was repeatedly successful on a patient at our clinic in producing inward pointing, and now during an induced nystagmus toward the non-cooled side, the reaction movement of the arm failed to go toward the outside. Besides these centers for the shoulder-joint, I have also by clinical observation located with certainty the center for the inward movement of the wrist-joint. It is located in that part of the cerebellum facing the posterior wall of the pyramid of the temporal bone, behind the internal auditory meatus. With these findings, I believe my theory of the cerebellum is placed out of the domain of possibility and probability, and put into the domain of certainty and I believe the time will come that not only suspected cerebellar disease, but especially every neurological case will have to be examined by my method, since otherwise the neurological status will be just as incomplete as a testing without examination of tendon reflexes or pupil reaction.

I have already mentioned in the report to the German Otological Society, that I have seen a great number of cases which showed characteristic symptoms. They are as follows:

When I test, in such cases, the spontaneous pointing movement in the wrist-joint of the diseased side, the patient points correctly with the hand, palm down, but on turning the hand, palm up, one notes an error in some cases; the patient mispoints inward; in other cases, however, we get a correct pointing. If the hand is now again placed in the first position, we get in all cases a pointing-error outward. I had seen these symptoms as well after incision of the cerebellum in meningitis serosa circumscripta of the posterior fossae as in a case of cysticercus of the fourth ventricle. It was further seen in a case of trauma of the skull, and finally in cases of unknown etiology where, however, I was forced to think of serous

meningitis. Since then I have seen a great many new cases, and noted symptoms. These cases are so similar that I do not hesitate to formulate a new disease picture; a new syndrome, with your permission, Barany's syndrome. It concerns patients who either have suffered for years from migraine, or whose nearest relatives have migraine or epilepsy. In many cases a previous middle-ear suppuration has been present, or is still present on the affected side.

In these cases we have unilateral deafness, with the characteristic inner-ear lesion. Associated with the deafness we have attacks of dizziness of vestibular type, and varying in degree. Besides, and this is most important, there are sensitive pain areas, localized on the posterior part of the head on the diseased side. Very noticeable in the anamnesis is the statement of the patients that at times they hear very well and at other times very poorly, being almost deaf. From this anamnesis alone I have concluded in eight to nine consecutive cases, that the above-described pointing-symptoms would be present, and have found it practically every time. As I have already explained, the spontaneous pointing-error may be due to a stimulation of the center toward which the finger deviates, or oftener to a paralysis of the antagonistic center, and takes place there by a relative over-balancing of the physiological tonus of one center by paralysis of the other. In the cases described, the pointing-error outward in a position, palm down, is due to a functional paralysis of the center for pointing inward. On the contrary, both centers function normally when the arm is in a position with the palm up. The proof of this will be the functional test. For example: the right side is diseased, then the mispointing with the right hand, palm down, will be outward. Now, by producing a nystagmus to the right the individual does not point, as normally, inward, but usually correctly. In the position with the palm up the normal reaction is present. He points, during a nystagmus towards the right. In the hand of the non-diseased side all reactions are obtainable in a normal manner. The explanation of the fact that in a position, palm down, no pointing-error occurs, but only in a position, palm turned up, I have already given in a previous report.

The position, palm down, is the usual position of the hand; for this position the cerebrum has learnt to replace the failing cerebellar function. Now if I turn the hand, palm up, a pointing-error inward not infrequently takes place. This, however, is not due to an absence of cerebellar influence, but to the persistence of the now false

cerebral impulse, since also for this position the cerebrum sends out a plus, left innervation.

The proof of this is explained as follows: The cerebellar innervation in this position is normally present. If we allow the individual to point a number of times with the hand, palm up, the cerebrum will send out the normal innervation and the pointing will be correct. Now by turning the hand again, palm down, the cerebrum will continue to send out the normal uncorrected innervation as in the position palm up, and in this way we get the spontaneous pointing-error outward.

How do we get this combination of lesion of the inner ear, headache and pointing-error; upon what does this disease depend? Pathologically we are not informed as to the fundamental causes of this symptom-complex, yet partly from analogy, partly from cases of serous meningitis produced by operations on otitis media suppurativa, and partly from the clinical course of non-suppurative cases, we can make some very probable conclusions. The pointing-error outward, the dizziness and the deafness must depend on one process, taking place on the posterior surface of the pyramid. For in the cerebellar region facing the posterior surface of the pyramid one finds the center for the wrist-joint for pointing inward, through paralysis of which center pointing outward occurs. Of great interest is the variations which take place in this disease. As already observed, the patients generally report that the hearing at times is good. I have observed great variations in these patients; at times almost normal hearing and at other times complete deafness. The irritability of the vestibular apparatus can likewise vary greatly. In two patients I have seen this variation from almost complete loss to normal irritability. Perhaps a simple exposure of the dura may not be sufficient, and that an incision of the dura itself must be made. Since the antrum is not opened we need not fear an infection from the middle ear, and therefore may consider this operation neither difficult nor dangerous. I wish to note at this opportunity, that where an exposure of the dura is indicated because of brain-pressure symptoms, the exposing of the dura through the mastoid process without opening the antrum seems to present real advantages, as by this route the dura does not lie directly beneath the skin and is therefore protected from external injury. Likewise we find at times no pointing-error with a normal irritability of the cerebellum, at other times the error is very marked.

This process must, therefore, be changeable and curable; for in two cases I have seen complete healing with normal hearing. Many

things speak for a relationship to migraine. I doubt not that Escat has described such cases under the name "Migraine otique." It appears to me therefore possible pathologico-anatomically to consider if only as either a temporary swelling or swollen condition of the cerebellar hemisphere, or more likely an abnormal liquid secretion, a liquid collection on the outer side of the cerebellum in the meshes of the pia around the internal auditory meatus. A disease of greater severity, called meningitis serosa, is described by Oppenheim, Plazek and Krause, and recently by Bing. If we accept this view we can understand the beneficial influence of lumbar puncture, in these cases, with or without exposing the dura of the posterior fossa through the mastoid process. In one of my cases, after lumbar puncture, the patient had an initial increase of headache, and then a disappearance of dizziness for a year, then the dizziness returned. A second lumbar puncture relieved the dizziness permanently. The hearing which was completely lost returned sometime after the operation. In a second case, though but a few drops were removed, the lumbar puncture was followed by severe headache and vomiting. Therefore I laid bare the dura in the region of the mastoid process without opening the antrum. Directly after the operation headache and vomiting ceased, the headache did not return on this side. Then the headaches set in on the other side, and while the hearing on the operated side returned to normal, the other ear became noticeably deafer, and the acuity of hearing fell to conversation *ad concham*. The pointing-error outward appeared in a striking manner on the second side. I therefore laid bare the dura of the posterior fossa of the second side. Directly thereafter the headaches stopped, the pointing-error disappeared. What the permanent effect in this case will be I cannot now say. I believe, however, that these cases with inner-ear lesions, headache in the occiput, dizziness and pointing-error outward for the wrist-joint, that is in cases with the Barany syndrom, must be amendable to an early operative therapy. I wish further to report a case which I had the opportunity to see at the Hochenegg clinic, and which seems to be of especial significance. September 3, I was called to a young man in the above-named clinic, who had attempted suicide by shooting a bullet into his right ear. On examination, I found a hemorrhage from the right external meatus, and a wound of entrance in the concha. With the "noise" apparatus on the left ear, the patient heard conversation *ad concham*. A slight nystagmus to the diseased side was present. Fistula symptom, e. g. nystagmus by compression and aspiration of air in the external meatus, was not pres-

ent. It was plain that the labyrinth was not injured by the bullet. I now tested the pointing movements. The left arm and both legs reacted normally. The right arm, however, mispointed strongly outward, in all joints and in all positions. Three days later I made another examination, and found no change except in one particular. The patient no longer mispointed with the hand, palm up, and with the hand, palm down, he no longer mispointed as strongly. The present testing methods by syringing the left ear gave very typical strong nystagmus without dizziness or nausea, and typical reaction movements of the left upper and both lower extremities. The right upper extremity tested in the shoulder-joint, however, pointed to the left, only with a position palm up; with a position palm down, there was no reaction toward the left. The reaction toward the left in the right wrist-joint was absent both in the position with the palm up and with the palm down. The reaction outward was present in all joints of the right upper extremity. Based on these findings, I made the diagnosis; penetration of the bullet back of the labyrinth, to the cerebellum, with injury of the cerebellum either directly or indirectly by the splintering of bone. This injury, however, being circumscribed, the concomitant symptoms had receded. When I wished to examine the patient a third time, he had already been sent home with a letter to me, asking further dispensary treatment. He presented himself September 16, with the statement that he had had a suppuration from the right ear for three days. The statement proved true and now there was no reason why a thorough examination of the right ear should not be made. The examination showed that the bullet, or a part of it was lodged in the external canal. Pain not present in mastoid process. The pointing-error in the arm had entirely disappeared; in the wrist-joint there was a slight pointing-error outward. The functional testing gave normal reaction for the shoulder-joint in all positions. In the wrist-joint the reaction inward was wanting. The cerebellar symptoms had, therefore, receded markedly; a severe injury could not have taken place. Still it seemed possible that an injury from bone splinters had occurred in the vicinity of the wrist-joint center. The aural suppuration furthermore demanded the removal of the bullet, which could be felt with a probe, before the appearance of threatening symptoms. I operated September 19, and found the bullet slightly embedded in the external meatus. I was forced to make a radical operation to remove the bullet. The bone as far as the posterior fossa was entirely intact. There was no reason to consider the dura of the posterior fossa injured, or to expose it. My diagnosis,

injury of the cerebellum by a bullet directly or indirectly from bone splinters was wrong. It was now clear to me that the entire paralytic signs which had disappeared so rapidly resulted from brain concussion caused by the bullet, and therefore this case classified itself with the already observed and demonstrated cases of brain concussion. During the last year I have seen six or seven such cases, in which following skull-trauma a pointing-error was present. In all but one case the reaction inward in the arm of one side was lacking and a pointing-error outward was present. Dizziness and deafness having the character of inner ear lesion, was always present on the side showing the pointing-error. In these cases I could notice a gradual recession of disease symptoms, entirely similar to the case with bullet injury. The similarity of all these cases suggested, that cerebellar injury near the posterior side of the pyramid may be a typical result of skull-trauma. If we remember that the cerebellum is covered above by a strong elastic tentorium, and lies embedded behind and below in the hollow of the posterior fossa, we can comprehend that by a strong concussion of the skull the cerebellum will be pressed most easily against the vertically projecting posterior wall of the pyramid, and it seems plausible that irrespective of the place of injury, that right at this point or place the injury will be most marked. That by a shot in the ear a severe skull concussion must take place is clear. The rapid disappearance of the cerebellar symptoms in the observed cases shows the necessity, in cases of brain concussion, of early examination by the new cerebellar testing methods, the practical importance of which, I hope, will assert itself more and more.

Peroral Intubation for Operations on the Nose, Mouth and Throat.

W. KOELLE. *Deut. Ztschr. f. Chir.*, March, 1911.

Koeller minutely describes Kuhn's flexible tube and reports its use in operations for cleft-palate, naso-pharyngeal tumors and on the tonsils. It also proved of aid in stilling buccal, pharyngeal and nasal hemorrhages. ED.

SOME POINTS IN THE EARLY DEVELOPMENT OF THE EAR.*

BY LOUIS K. GUGGENHEIM, M. D., ST. LOUIS.

In this paper I have striven to clearly bring out certain important points in the early development of the ear, confining myself to the first few months of fetal life. The later changes, including the development of the processus mastoideus, the os tympanicum, etc., I have not considered.

EMBRYOLOGICAL MATERIAL.—The illustrations, with the exception of Figure 11, are micro-photographs of specimens selected from several hundred serial sections made by the author while at the embryological institute of the University of Vienna. The smaller specimens were embedded in paraffin and stained chiefly with carmin. The larger ones were embedded in celloidin and stained partly with hematoxylin-eosin, partly with Van Gieson's picric acid fuchsin.

THICKENING OF THE ECTODERM.—(Figure 1). During the first few days of life there occurs in the head-end of the embryo a thickening of the ectoderm. This thickening is the first evidence we have of the formation of the organ of hearing. It is seen in Figure I chiefly to the right of the central nervous system.[1] The specimen having been imperfectly sectioned the thickening[2] is plainly discernible only on the one side.

FORMATION OF THE FOVEOLA LABYRINTHICA.—(Figure 2). Toward the end of the second week a sinking inward of the thickened ectoderm results in the formation of the foveola labyrinthica.[1]

THE AUDITORY VESICLE.—(Figure 3). Gradually the edges of the foveola labyrinthica approach each other, and finally during the fourth week coalesce to form a closed sack or vesicle. Before the closure is complete the foveola labyrinthica communicates with the surface of the embryo by means of a small canal known as the appertura vesicula auditiva.

The auditory vesicle[1] is lined with columnar epithelium and filled with an albuminous fluid suspended in which is a crystalline body known as the auditory stone or otolith. In the preparation of the specimen the stone has been dissolved, so that nothing of it is seen in the picture. It may be of interest here to mention that

*Read before the Meeting of the Oto-Laryngological Section of the St. Louis Medical Society, April 26, 1911.

in certain of the lower animals this rudimentary auditory apparatus is retained throughout life.

FORMATION OF THE DUCTUS ENDOLYMPHATICUS.—(Figure 4). During the next few days the auditory vesicle develops a dorso-

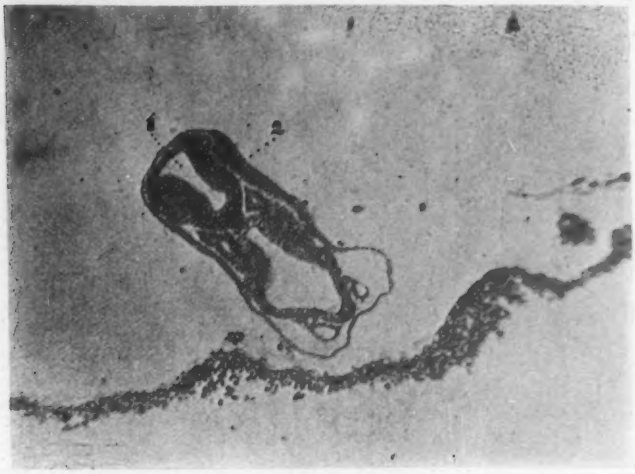


Figure 1.

Figure 2.

mesial evagination, the recessus labyrinthi. This gradually increases in length to form the ductus endolymphaticus,[1] which is seen to the right and left of the central nervous system in the picture.

FORMATION OF THE DUCTUS COCHLEARIS, THE UTRICULUS, SACCULUS, AND SEMI-CIRCULAR CANALS.—(Figure 5). Following the

formation of the ductus endolymphaticus there occurs an evagination in the ventral wall of the auditory vesicle, the recessus cochleae. This recessus cochleae is the beginning of the ductus cochlearis. At the same time the mesial wall becomes constricted in the center, thus incompletely dividing the vesicle into two smaller sacks. The

Figure 3.

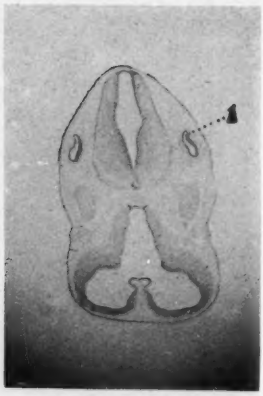


Figure 4.

dorsal sack is to form the utriculus, the ventral the sacculus. Shortly after, the body of the utriculus shows on section a half circle superiorly, a horizontal base inferiorly. The arch, superiorly, goes to form the two vertical semi-circular canals, the base the horizontal canal.

In the picture is seen dorsally a section of a semi-circular canal.[1] Anterior to this is the utriculus[2] and sacculus.[3] Ventrally is the ductus cochlearis,[4] in the concavity of which is the spiral ganglion of the cochlea.[5]

FORMATION OF THE PERILYMPHATIC SPACES OF THE LABYRINTH: As soon as the foveola labyrinthica has closed to form the auditory vesicle we have present an endolymphatic space. In the following manner the perilymphatic spaces of the labyrinth are formed: In

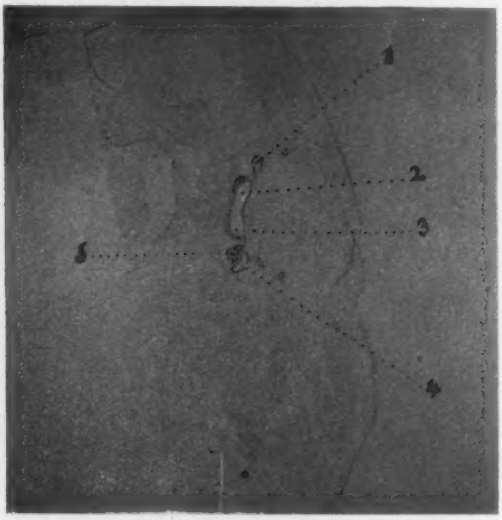


Figure 5.

the immediate vicinity of the membranous labyrinth mesoderm is differentiated into a connective tissue wall for the former, the remaining layers, except in those areas where the membranous labyrinth later becomes adherent to the osseous, being transformed into a mucous or embryonic connective tissue. The latter is surrounded by a more compact tissue, from which are derived first, cartilage, then bone and periosteum and thus finally the osseous labyrinth. By a peculiar process of regressive metamorphosis most of the mucous connective tissue later disappears. Its disappearance results in the formation of the perilymphatic spaces of the labyrinth.

FORMATION OF THE ORGAN OF CORTI, THE MACULAE ACUSTICAE AND CRISTAE ACUSTICAE.—(Figure 6). At a very early date the

epithelial lining of the ductus cochlearis, the utriculus, sacculus, and semi-circular canals shows on one wall of the above-mentioned parts a very decided thickening. This thickening is the beginning of the organ of Corti in the cochlea, the maculae acusticae in the utriculus and sacculus, and the cristae acusticae in the semi-circular canals. The thickening in the ductus cochlearis soon shows a division into two prominences, a large median one and a smaller lateral one. The larger prominence will form the epithelial covering for the crista spiralis. Resting upon its surface soon after its

Figure 6.

formation is seen a thin membrane, the future membrana tectoria. The smaller prominence to the lateral side will later become the organ of Corti. These changes are noticeable before resorption of the mucous connective tissue begins.

The picture shows a horizontal section of a cochlea in which resorption of the mucous connective tissue is just beginning. It will be noticed that this interesting change occurs first in the base of the cochlea.

On the left is a section of the basal turn of the ductus cochlearis.[1] To its right is the spiral ganglion.[2] Above and below are the two scalae.[3-4]. These are not yet entirely free of the mucous connective tissue. The other turns of the ductus cochlearis are still com-

pletely surrounded by embryonic connective tissue.[5] On the floor of the ductus cochlearis in each turn is the thickening in the epithelial lining, which is to form the organ of Corti, etc. The large[6] and small[7] prominences are plainly seen. In all but the apex-turn the thin membrana tectoria is present.[8] Surrounding the two and a half turns of the ductus cochlearis is the cartilaginous capsule[9] of the cochlea. Above the cochlea is the Eustachian tube,[10] to the left the middle ear,[11] etc. In the lower right-hand corner of the picture is the brain.[12] Just to the left of the brain is the nervus vestibularis[13] with the vestibular ganglion.[14]

Figure 7.

FORMATION OF MEMBRANA REISSNERI AND LIGAMENTUM SPIRALIS.—(Figure 7). As the mucous connective tissue is resorbed the upper or, anatomically speaking, external wall of the ductus cochlearis becomes very thin to form the membrana Reisnerri. To the lateral side of each turn of the ductus cochlearis a portion of the embryonic connective tissue is transformed into adult connective tissue to form the ligamentum spiralis.

The picture is a horizontal section of the cochlea. Throughout we see the fully formed scalae tympani[1] and vestibuli.[2] To the inner side of each turn of the ductus cochlearis is a section of the spiral ganglion.[3] In the floor of the ductus cochlearis we see to the median side, the crista spiralis[4] with the sulcus internus. Ex-

tending outward from the crista is plainly seen the thin membrana tectoria.[5] Above this in each turn and extending from the crista spiralis to the ligamentum spiralis is the membrana Reisnerri.[6] To the lateral side of the crista spiralis is the organ of Corti.[7] Externally is the ligamentum spiralis[8] with the stria vascularis. The changes occurring in the vestibule and semi-circular canals are practically the same as those just described for the cochlea, only very much more simple, so that no further mention need be made of them here.

DEVELOPMENT OF THE TYMPANUM AND OSSICLES.—(Figure 8). Thus far I have followed the development of only the aural laby-

Figure 8.

rinth. What of the external ear and the tympanic cavity with its contents? First a word concerning the branchial clefts. These peculiar fissures in the head-end of the embryo are the result ot a growing outward of entoderm, lining the alimentary canal, into mesoderm. The projections later unite with the ectoderm. Small openings then occur in the surface of the ectoderm at the tip of each projection. In this manner the clefts are formed.

The columns of mesoderm between the clefts constitute the branchial arches. The first branchial arch divides into a superior maxillary and a mandibular process. From the latter is formed

Meckel's cartilage. From Meckel's cartilage are developed the two large ossicles of the ear, the malleus and the incus. From the second branchial arch known as the hyoid arch, is formed Reichel's cartilage. From this cartilage the stapes is developed.

The drum membrane is formed from tissue derived from the first and second branchial arches and connects the two. At first very thick, it gradually becomes very thin from absorption of water. To its median side is seen, at a very early stage of development, a mass of mucous connective tissue and a small cavity continuous with the alimentary canal. The cavity, which is the median portion of the first branchial cleft, forms the Eustachian tube. Resorption of

Figure 9.

the mucous connective tissue gives rise to the tympanum, External to the drum-mass is the remainder of the space of the first branchial cleft, which later becomes the external auditory canal.

The picture is a horizontal section through the superior division of the tympanic cavity, and through a portion of the labyrinth. In the middle ear we see the incus[1] in articulation with the malleus.[2] Extending anteriorly from the malleus is a portion of Meckel's cartilage[3] from which both the malleus and incus are derived. This portion of the tympanum is still filled with mucous connective tissue.[4] In the labyrinth is seen posteriorly the utriculus[5] with the

vestibular nerve[6] and ganglion.[7] Anterior to the utriculus is a section of the facial nerve.[8] To the median side of the labyrinth is the brain.[9]

In Figure 9 we see a horizontal section of the tympanum and internal ear at the level of the oval window. In the tympanum is a quantity of mucous connective tissue,[1] although the formation of the cavity[2] is well under way. On the median wall we see the stapes[3]

Figure 10.

articulating by means of the annular ligament with the labyrinth capsule and filling the oval window. Between the crura is the stapedial artery,[4] an embryonic structure which disappears before birth. Attached to the head of the stapes is Reichel's cartilage. Posterior to the stapes is the facial nerve[5] in its incomplete canal.[6] To the median side of the facial is the stapedius muscle.[7] In the inner ear we see anteriorly the cochlea,[8] in which the scalae are entirely free of mucous connective tissue. Posteriorly are sections

of the semi-circular canals.[9] To the median side of the labyrinth is the brain.[10]

This picture (Figure 10) gives us a view of a frontal section of the ear at about the same stage of development (third month). The middle ear is partially filled with mucous connective tissue.[1] Superiorly is the facial nerve.[2] Below this is the stapes[3] in the oval window, then the promontory,[4] and inferiorly the round window closed by the membrana tympani secondaria.[5] In the labyrinth we see above, the ampullary end[6] of the horizontal semi-circular canal. Inferior to this is the utriculus.[7] To the median side of the promontory is the beginning of the cochlea.[8]

Figure 11.

DEVELOPMENT OF THE EXTERNAL EAR.—(Figure 11). Toward the end of the fourth week of fetal life six small prominences develop from the first and second branchial arches, laterally. Between these prominences are spaces leading inward to the mass of drum membrane. The spaces later elongate to form the external auditory canal. The six prominences form the auricle. One is for the tragus,[1] two for the helix,[2] one for the anti-helix,[3] one for the anti-tragus,[4] and one for the lobule.[5] The picture gives a view of a very young human embryo, showing the first branchial cleft and the six prominences above mentioned.

Metropolitan Building.

A REVIEW OF EIGHTY-ONE CASES OF INFLAMMATION OF THE FRONTAL SINUS.—A COMPARATIVE STUDY.*

BY GEORGE L. RICHARDS, M. D., FALL RIVER, MASS.

For the purpose of analyzing the relative number of cases of acute and chronic inflammation of the frontal sinus which I have seen during the last few years, I have gone over my records and made some comparisons with reference to their etiology and the results of treatment. Acute inflammation of the frontal sinus is either markedly on the increase or else relief is oftener sought of the specialist than in former years. It is my belief that since the prevalence every year of grippal colds the absolute number of cases of frontal sinus inflammation has increased. Some years ago I reported to this society a number of cases of radical operation, and these are now referred to for purposes of comparison only. None but cases of undoubted frontal sinus trouble are included, the diagnosis having been confirmed by the presence of pus, trans-illumination, probing or syringing, or by symptoms which rendered it unmistakable. Radiographs were not taken as I have not been so situated as to make this practicable. I have invariably used trans-illumination in all suspected cases, and while not infallible, it does furnish in most instances valuable diagnostic information, and I rely considerably on the findings. In most of the cases herewith reported, trans-illumination was positive. It seems to be of little or no value except for diagnostic purposes, giving little information as to the progress of the disease, since even when pus has been evacuated, the sinus will still look dark until the mucous membrane has again resumed its normal thickness.

These comparisons are made on a study of eighty-one cases, ranging in age from 13 to 70 years. Cases now under treatment are not included, so that the end-results are known. The patients came with the following complaints: Sixty-eight, or eighty-five per cent, complained of pain in some form or other, either as headache, severe sharp pain referred to the region of the frontal sinus, or the combination of pain with discharge. In addition to the pain one had exophthalmos. Ten complained of discharge only, the secretions not being sufficiently pent up to cause severe pain. One

*Read before the Annual Meeting of the American Laryngological Association, Philadelphia, Pa., May 30, 1911.

came on account of the symptoms of general anemia and pus absorption, having been referred on account of long continued pus discharge. One complained of swelling on the face, nature having forced an opening through the cheek—the only case of this kind I have ever seen. In the very acute cases local tenderness was often present, but this was by no means invariable. The point of reference of the pain, while in the main of diagnostic value, is not always certain, as one case who was proved to have no involvement of the frontal sinus but instead of the antrum, complained of pain in the region of the frontal sinus and had had a partial operation performed on the frontal before coming under my observation. The pain was due to a reflex from the antrum pressure and ceased at once after a radical operation on the antrum and must have been wholly due to the pressure of the retained antral secretions.

ETIOLOGY: In forty-one cases the cause was embraced under the term "grippal cold," this term being used as a probably accurate cause in the by far larger number of the acute attacks. In the case of the chronic inflammations and some of the acute ones, the etiology as given was so indefinite that I have classified it as unknown, and of these there are thirty-five. Swelling of the fronto-nasal ducts is given on the records only once as the direct cause, it was doubtless responsible for the trouble in a good many other cases. The same is very likely true of ethmoiditis and of antrum suppuration, since many of the cases had suppuration both in the antrum and the frontal sinus, and in chronic inflammation it is often impossible to determine which is primary. One case came so directly after an automobile ride as to make it appear at least that the fast riding and possible dust inhalation was responsible. To my mind the automobile is and will continue to be a great factor in the production of inflammatory troubles of the upper air tract. It grinds up the road-bed into dust and then throws it into the air to be breathed by all passers-by.

PLACE: Both sinuses were involved nineteen times, the left sinus alone twenty-six times or 32.5 per cent; the right sinus alone, thirty-six times, or 45 per cent. In the acute cases the involvement of the right or the left, rather than the reverse, was apparently due in the individual case to the anatomic conformation of the nose and the relation of the fronto-nasal outlet to the septum and to the turbinate; the most obstructed side being the one usually involved. Where both sinuses were involved there was frequently communication between the two, though not always.

ACUTE AND CHRONIC: Forty-eight, or 59.2 per cent of the cases were acute; six, or 7.5 per cent were sub-acute; twenty-seven, or 33.4 per cent were chronic.

PUS DEMONSTRATED: Pus was demonstrated in seventy-four, or 91.35 per cent. Five cases I have designated as gas cases. In these I considered the symptoms to be due to closure of the outlet of the fronto-nasal canal, with a consequent sense of pressure caused by the expansion of the air or gas within the sinus or possibly to the reverse, viz: an absorption of air in the sinus with resultant pain. There is no way of absolutely determining this. One of the series was operated on externally for this negative pressure, the middle turbinate having been removed without making it possible to probe the fronto-nasal duct and without relieving pain. The patient was told in advance that probably no pus would be found. The fronto-nasal duct was found closed for a considerable distance and had to be re-opened by curetting and there was no pus in the sinus. There had been frequent severe headaches which entirely disappeared after the operation which was done after the Ogston-Luc method, with immediate closure of the external opening. In the second case of this kind pus was suspected but not found. In two other cases there was no pus but the acute pain was relieved by syringing through the fronto-nasal duct and the general symptomatology seemed to warrant the diagnosis of acute frontal sinusitis. The pain may have been due in these two cases, as in the five, to the presence of gas.

COMPLICATIONS: In fourteen cases the antrum was also involved, and in these appropriate treatment was given at the time. Three had otitis media on one side, due apparently to direct infection by the pus through the Eustachian tube. In one instance otitis media occurred on both sides, accompanied by a profuse amount of discharge. As the otitis media occurred after the initial diagnosis of frontal sinus trouble was made it admits of no doubt in my mind that it was secondary to the frontal sinus trouble. In one of these cases of otitis media, bacteriological examination showed the presence of micrococcus catarrhalis. In one case a grippal cold brought on an acute mastoid and probably co-incidentally a frontal sinus trouble, but the frontal sinus was not noticed until during the convalescence from the mastoid operation. There was atrophic rhinitis in three cases. There was an external opening in one. There was a nasal spur in two. There were septum deviations in three, so marked as to really complicate. In many of the others there were minor septum deviations. One case had involvement of both

antra, the right sphenoid, and the ethmoid cells. Another had involvement of both sphenoids, both antra, and the ethmoids.

TREATMENT: Sixty-five cases were treated intra-nasally, and in fifteen radical operations were done. In all of the intra-nasal cases syringing with varying solutions through a canula, for the most part of a simple sterile saline solution of the Seiler tablet type, was used and formed the basis of the intra-nasal treatment. In a few cases persistently obstinate, other solutions were used, such as weak corrosive sublimate, solution of copper sulphate, argyrol and others. Simple syringing with any sterile, non-irritating solution, is usually all that is necessary, the solution clearing out the sinus to a greater or less degree and leaving the outlet free so that it drains satisfactorily during the hours which follow the syringing. Twenty cases were syringed or washed through the canula without removal of the turbinate. In one treated the same way there seemed to be no result until a copper sulphate solution was used for a few months, after which a complete cure took place. This patient absolutely refused to allow the removal of the middle turbinate, even though the introduction of the canula was painful and difficult. Three years have elapsed and this patient remains well. In thirty-two cases the middle turbinate was removed at the very beginning of the treatment. In two, simple shrinking was sufficient. In four cases shrinking and partial fracture of the turbinate, that is, displacing it toward the septum allowed entrance to the duct. In one the turbinate was removed and the ethmoid curetted before entrance could be obtained. In one the simple shrinking without syringing answered. In four the outlet only was curetted. In this respect one case is interesting as it had been previously operated on satisfactorily intra-nasally by a prominent laryngologist of Brooklyn, and came into my hands during the summer vacation of the patient. I found the outlet of the fronto-nasal duct covered over by a thin bit of organized tissue. When this was removed the fronto-nasal duct was again made patent and all the symptoms of pain and discomfort immediately disappeared. For the permanent comfort of patients with frontal sinus trouble it is essential that the fronto-nasal duct remain open. Sixteen cases were operated upon radically; that is by some type of external operation, with re-opening or enlarging of the fronto-nasal duct and clearing out of the neighboring ethmoid cells as far as possible, and after treatment either by immediate closure of the external wound or closure at the end of ten days or a fortnight—the so-called Ogston-Luc operation with variations; by operation in the same way but maintaining

the external opening and filling in with granulations, and by the Killian operation. There were six of the Ogston-Luc type. In one case two operations were done three years apart with apparent cure in the interval, but an ultimate breaking out because the first operation was not sufficiently thorough. In two cases the external opening was absolutely maintained until the filling up with granulation took place. There were two cases in which the middle turbinate was first removed and an attempt made to cure by intra-nasal treatment. This failed and an external operation was afterwards done. There were two cases in which the Ogston-Luc operation was first done, but because of failure to heal the Killian was afterwards performed. There were two cases of Ogston-Luc with several re-operations of the same type, and one of these will require some form of more radical operation before an absolute cure will result. There was one Killian operation with apparent cure for seven months, but afterwards breaking out with pain and slight pus discharge at the lower border of the external wound. One examination one diseased ethmoid cell was discovered; this being thoroughly removed prompt and permanent healing took place. Proportionately, eighty per cent were found to be curable intra-nasally, and twenty per cent required some type of external operation.

RESULTS: Sixty-six cases can be considered as cured, although in one of them in which there was general ethmoiditis with involvement of the sphenoid and antrum as well as both frontals, the final cure did not occur until after five years. Two acute cases had recurrent attacks, one being finally cured and the other having still an occasional recurrence of the acute attack. There was improvement in eleven. Under these I include those which had improvement at the time they disappeared from observation. They were presumptively cured but the record is not definite as to this. Two were lost sight of after the first examination and treatment. Whether sufficiently relieved or whether treated by another physician I do not know. Eighty-three and three-quarter per cent can fairly be said to have been cured. Of course it is possible that some of these which are reported as cured may have had subsequent trouble.

REMARKS: One case operated upon externally for severe headaches, in which the simple Ogston-Luc operation with immediate closure of the external opening was done and a drainage tube maintained in the nose for about ten days, had at first immediate relief, then came back some weeks after complaining of occasional

severe headaches. Examination showed that the opening down into the nose had been made either insufficiently large or had not been maintained long enough; anyway, it was impossible to pass a probe up into the sinus. The pain was apparently due to gas or air-pressure, positive or negative. Later a probe was carried by this point and the headaches disappeared. Were I to do this same case again I should maintain the drainage tube for a very much longer period.

One case has long intervals of no trouble, the middle turbinate having been removed on each side, but after a period of some months and after a few severe colds will come back with some polypi blocking up one or the other of the fronto-nasal outlets. This case cannot be called a cure, yet as both sinuses are involved and they communicate, an external operation seems to me unwarranted, but would not be accepted by him even were I to suggest it. Another case, previously referred to as the one suffering from general anemia and pus absorption has obtained a cure of the sphenoid and both antra, but has a little pus-discharge from the two frontal sinuses, which are large and communicative. This patient is a woman, fair-featured, able to perform her usual avocation, and an external operation seems to me unwarranted, as there are no symptoms except a little purulent discharge hardly enough to be noticed, and this at times almost disappears.

The sinuses communicate far oftener than formerly supposed was the case, this condition existing in a good proportion of the chronic cases and I think occasionally in an acute one, especially if it be bilateral. Several of the cases cured by intra-nasal treatment have been chronic and I by no means despair of obtaining a cure in a chronic case by intra-nasal treatment, provided reasonably good drainage can be obtained. As gravity favors natural drainage this should always be tried in the absence of severe symptoms for a suitable length of time. Several of my cases have absolutely proved this. The time required for a cure has been various, from a few days in the sharply acute case to a matter of weeks or months. In most of the acute cases where the middle turbinate was removed the treatment covered a period of two or three weeks. Removal of the anterior end of the middle turbinate will be required in most cases and greatly facilitates treatment.

124 Franklin Street.

LATENT SINUSITIS: SYMPTOMS AND RESULTS, IMMEDIATE AND REMOTE.*

BY G. F. COTT, M. D., BUFFALO, N. Y.

The cause of latent sinusitis is some previous attack of pansinusitis occasionally leaving but one sinus, so crippled as to produce prominent symptoms afterwards. The bacteria found in sinus-pus are, with few exceptions, streptococcus, staphylococcus pyogenes aureus, diplococcus launceolatus, bacilli of diphtheria and Friedlander's bacillus, also bacillus of influenza and occasionally bacilli distinctive of dental caries. Virulent organisms are present in recent or violently acute cases.

Most observers noticed that the antrum is more infected by way of the nose than by way of the teeth. Some claim that thirty per cent are due to carious teeth, while others found but ten per cent. My own cases considered under the heading of latent sinusitis average probably but three per cent. Chronic antral suppurations may perhaps be equally divided between infection from the nose and teeth, but in latent sinusitis we seldom, if ever, have but one sinus affected, although one sinus may give the most trouble.

Latent sinusitis is the condition following suppuration in which the cavities having become denuded of their membranous covering, leaving the sensitive nerves exposed, for the destructive process does not generally extend to the nerves. The cause of the sinus suppuration may be measles, scarlet fever, diphtheria, typhoid fever, small-pox or other zymotic diseases, but far more prominent is influenza because it is such a universal disease and affects by preference the adult.

Occasionally we find bacteria so virulent that the bone itself becomes softened and destroyed, letting the pus escape into the tissue around the sinuses or into the cranial cavity, or infection is carried to the brain and its membranes by the vessels and nerves. However, destruction of bone or perforation I have found only in malignant disease and syphilis. Ethmoid and sphenoid sinusitis may end by infecting the meninges producing pachymeningitis, epidural abscess, leptomeningitis, sinus thrombosis and brain abscess or also general pyemia.

Results of a most troublesome character but seldom leading to a fatal issue which may follow suppuration or latent sinusitis are:

*Read before the meeting of the New York State Dental Society, Buffalo, N. Y., April, 1911.

post-bulbar cellulitis or abscess; complete, irremediable or partial optic neuritis and consequently blindness; or if the suppuration is of a milder character the irritation produces hyperplasia of the upper nasal mucous membrane with polypi and periodical headache.

In latent sinusitis there may be no symptoms as in latent appendicitis until some irritant wakes the quiescent bacteria, such as exposure to cold, dust, chemicals, etc. Often the patient has entirely forgotten the first attack of sinusitis which may have passed off as a severe cold, the blowing out or swallowing of pus seemingly not having made much of an impression on the patient, for vast numbers survive acute suppuration and enter upon the latent stage.

Mucocele of latent sinusitis. (Dr. Alise Bennett.)

These quiescent periods may last any number of years. When the sub-acute stage is manifested it has no distinctive symptoms nor do two patients have symptoms alike. We find for instance in the different patients varying from 12 to 65 years of age, mostly from 20 to 40 years, the following: pain over nasal process of superior maxilla and sometimes swelling; or pain only on pressure, sometimes also redness, or entire absence of any pain; swelling of upper eye-lid, unilateral exophthalmos or post-bulbar cellulitis; blurred vision; rhinorrhea; continuous, periodical or only unilateral discharge of muco-pus from nose; pus escaping down naso-pharynx into larynx and trachea; or pus escaping into esophagus, stomach

and intestines; anorexia, pasty secretion in pharynx causing periodical retching and vomiting; frontal pressure pain; severe pain on top of head or occiput; chronic lateral pharyngitis with thickening of mucous membrane. Ecchymosis of conjunctiva, infected conjunctiva, cacosmia, anosmia, excoriation and fissure of nares due to acrid secretions, hoarseness, nasal obstruction and weak heart. Eyes red, swollen and sore, mornings; lids pasted together and can only be opened after warm water has been used, condition caused by the infection passing up the lacrimo-nasal duct. Cough during the night due to patches of dryness in the pharynx or severe spasmodic cough during the day-time only. The above symptoms are not necessarily due to one sinus but often one is more prominent in its manifestations.

Hypertrophy of upper lip. (Dr. Fell.)

Before speaking of results let me tell you what is usually found upon close inspection of these latent cases upon opening the several cavities: pus in a few cases, muco-purulent secretion in most of them, denuded bone in all of them, but occasionally some apparently healthy mucous membrane in some ethmoid spaces and in the antrum. In a few the thin ethmoid cell-walls are destroyed and eburnated, the whitish glistening bone alone is seen, occasionally conglomeration of small polypi in the cells and caseous material in the sphenoid sinus; foul granulations and polypoid degenerations in the antrum.

Now let us go over the list of immediate results which are noticed in latent sinusitis, that is, conditions complained of when the patient presents himself for examination. Many have neuritis in some part of the head, face or meninges, occasionally only certain twigs of the sensory nerves are affected either intra- or extra-cranial. The most

severe pain is referred to the brain. This is easily explained by the profuse distribution of sensory nerves to the meninges. Of the twelve cranial nerves, the fourth, fifth and twelfth supply the dura mater, while the pia is supplied by the third, fifth, sixth, seventh, ninth, tenth and eleventh. Some of these are motor nerves but they receive sensory branches from the trifacial, glosso-pharyngeal and pneumo-gastric.

SYMPTOMS:—Nearly total blindness or partial blindness called scotoma, due to partial optic neuritis affecting one or both eyes; loss of memory, inability to read, write or sew, as these things cause pain in the eyes or forehead; pseudo-kleptomania; insanity; indicanuria due to intestinal toxemia; partial deafness; tinnitus;

Hypertrophy of nose in latent sinusitis. (Dr. C. Cott.)

tracheitis with harrassing cough; chronic headache coming on periodically sometimes immediately due to thickened upper septum pressing upon the middle turbinate, great dizziness. Pus at inner angle of eye from the lacrimal duct. Pain in the ear with circular myringitis or acute otitis media with suppuration.

When latent sinusitis has produced none of these immediate results severe enough to require the attention of a physician or for some reason or other the patient was not suffering enough to call for treatment we find the following remote results:

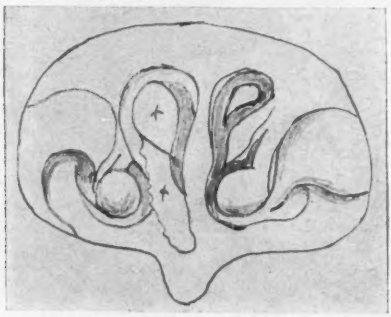
Atrophy of the mucus membrane of the nose, pharynx, or larynx, pachydermia laryngis, great enlargement of the lower nose, hypertrophy of upper lip, xanthosis, periodical attacks of facial erysipelas,

weak heart, mucocele, asthma, constitpation, anemia and rosacea of nose and cheeks.

Of course, any or all o' these immediate or remote results may be due to other factors than latent sinusitis, but when found in spring or fall they usually can be attributed to some previous sinus affection and the treatment will soon eliminate the doubt.

As TO DIAGNOSIS:—The Roentgen rays in skiagraphy taking a frontal and lateral view show the seat of pus; but in latent disease

Muco-pus from antrum and frontal sinus. (Dr. Fell.)



Muco-pus from ethmoid cells. (Dr. Fell.)

there often is no pus, but muco-purulent secretion or a dry cavity. Transillumination gives the same result. Diluted peroxide injected into the different sinuses produces foaming of thick escaping substance. The probe will indicate denuded bone of the ethmoid where no secretion is noticed. Bulging of the eye-ball or swelling of the lower lid or bulging over the inner angle of the eye, pain over nasal process, forehead, center of head, in the brain or one-half of face.

One per cent cocain with one to one thousand adrenalin shrinks the tissue so that close observation can be made. Then clammy, pasty exudate is seen anywhere in the upper-air tract. It is sometimes difficult to locate the offending sinus but rarely are all immediately affected, although all are always in the latent stage.

All patients do not completely recover, in fact, a few show no improvement at all. In many, the treatment is palliative, in others, apparently complete recovery takes place, to belch forth again in a later season, perhaps years after.

This latent sinusitis is found in all walks of life but more, yes, very much more often, in the middle class of people between the

Cyst of middle turbinate in latent sinusitis. (Dr. Fell.)

rich and the poor, those who have the ordinary comforts of life but have no time to take care of themselves when apparently slightly ill. In dispensary practice I have found comparatively few of these cases, likewise in the luxuriously rich. The good Lord seems to protect the poor while climatic immigration does it for the rich. The plugging intermediate who works for the good "eats" has the honor to carry off the brunt of this miserable affection.

Treatment is summed up in a few words, but is often a very long process: Drainage either exudative or pneumatic. When there is neuritis present it is often relieved by simply opening the sinus or sometimes by relieving the air-spaces by retraction of tissue in the nose, i. e., pneumatic drainage.

Mixed infection is easiest relieved by flushing out the sinuses with some antiseptic, non-irritating fluid, daily or less often for days or sometimes several weeks. When the infection is due to streptococci, the problem is a most difficult one to solve. Opening the antrum under the lip, the frontal sinuses externally, curetting, packing, iodine, carbolic acid and alcohol, flushing, dry antiseptic powders, etc., all do good to ameliorate the symptoms but now and then one does not recover or often makes no improvement at all. Pneumatic suction often is beneficial. Inoculations have been tried experimentally but nothing definite resulted. Bismuth paste and chalk paste are now on trial, so far without any brilliant success. But as the vast majority of cases are of the mixed variety improvement rapidly follows drainage.

These patients must afterwards protect themselves in cold, raw, damp weather by proper clothing, long sleeves for women, high shoes and neck covering. When a sub-acute attack comes on they must go to bed immediately, for how many die of pneumonia following latent sinusitis will never be known.

In conclusion I want to mention one important fact. The remote results or conditions are seldom relieved by treating a latent sinusitis. After the destructive perverted function of the sinus disease has spent its force, treatment will be of no avail. We must direct our attention to the effect, and can generally improve conditions materially so as to make the patient again comfortable.

1195 Main Street.

Galvanic Nystagmus. H. MARX. *Ztschr. f. Ohrenh. u. Laryngo-Rhinol.*, Aug., 1911.

The author conducted a series of experiments with guinea-pigs, first plugging the semi-circular canals, then destroying the same and the entire labyrinth. In every case the normal galvanic reaction could be elicited. These experiments prove that galvanic nystagmus is independent of the function of the ampullar epithelial cells and that the galvanic reaction is of no value in the differential diagnosis of conditions of the various parts of the labyrinth.

GLOGAU.

EPIGLOTTIDECTOMY: THE RATIONAL TREATMENT OF EPIGLOTTIDEAN TUBERCULOSIS.*

BY LORENZO B. LOCKARD, M. D., DENVER, COLO.

The operation of epiglottidectomy has now been performed in a series of cases sufficiently large and varied to permit of certain definite deductions and recommendations unwarranted in the author's previous reports.

The earlier operations of this nature were performed upon patients with such extensive involvement of both lungs and larynx that hope of any effect beyond temporary local palliation could not be entertained, yet the results achieved were occasionally of so remarkable a nature that the scope of the operation has been gradually extended until to-day it is undertaken almost as frequently for the cure as for the relief of the local disease.

Tuberculosis of the epiglottis is universally recognized to be the most fatal as well as the most painful laryngeal localization of the disease, the odynophagia itself being responsible, in great degree, for the high mortality.

It is extremely rare that this focus is an isolated one, the preponderating majority being associated with and secondary to lesions of the lungs and of other segments of the larynx, lesions not infrequently incipient or quiescent until aroused into activity by the development of this complicating process. Particularly does this result ensue when true odynophagia has supervened.

The general futility of treatment in such cases has become a truism; when there is only circumscribed ulceration or infiltration, medicinal treatment and curettage may effect an occasional cure, but when the process has advanced to wide-spread ulceration or massive infiltration, such methods are usually worse than valueless, for they are not only ineffective in practically all cases, but the persistence of the odynophagia during this probationary period rapidly destroys the vitality so essential to ultimate recovery.

Even when the odynophagia is temporarily relieved by such methods as the injection of alcohol into the internal branch of the superior laryngeal nerve, or the submucous injection of novocain or alypin, the basic process itself, if advanced, remains uninfluenced, and there usually persists sufficient dysphagia to seriously interfere with proper alimentation.

*Presented as a candidate's thesis to the annual meeting of the American Laryngological Association, Philadelphia, May, 1911.

The injection of alcohol is infinitely more painful than the complete removal of the diseased organ and while the former simply subdues the pain for a short period, the latter does it more effectively and permanently, at least that part due to the epiglottidean involvement, and at the same time exercises a distinctly curative effect, not upon this one focus alone, but upon the complicating laryngeal lesions as well.

As a purely palliative procedure, in advanced cases, its worth has been repeatedly proved. Of 151 cases capable of exact analysis and accurately observed, the pain was relieved in 127, or 84.10 per cent.

There were 16 cases that would have been classed as favorable if the epiglottis had not been involved, and of these, 100 per cent were completely relieved; 95 would have been considered hopeless even without the epiglottidean disease, and 88 of these were benefited to such an extent that both liquid and solid food could be swallowed with comfort. Of 40 additional cases, which could not be exactly classified, 25 were permanently relieved of pain.

In further explanation of these statistics may I be permitted to quote briefly from a previous paper:

"In considering these figures allowance must be made for two sources of error; in the first place, in a small number of cases, after varying periods of relief, some pain recurred owing to the progression of complicating laryngeal lesions, and on the other hand, some cases benefited to a considerable degree were not classed as successful, for I have attempted to tabulate as relieved those only in whom no dysphagia persisted."

In many instances complete relief, as a result of this single procedure, cannot be hoped for, additional measures directed to accompanying lesions being frequently demanded, but it is a matter of constant surprise to witness the complete disappearance of the odynophagia even when all other parts of the larynx are extensively ulcerated and infiltrated. A striking example—though a necessarily unusual one—of such an outcome, is found in the subjoined case of which photographic reproductions of the larynx and amputated epiglottis are shown in Figures 1 and 2.

This patient, a man of 42 years, had extensive disease of both lungs and the entire larynx. The epiglottis was very thick and dotted with numerous deep ulcers on the laryngeal surface, the free edge and left side of the lingual surface. Slightly below and to the left of the petiolus was a mass of granulation-tissue as large as a filbert. Both ary-epiglottic folds, arytenoid cartilages and vocal cords were ulcerated throughout, and the ventricular bands were

infiltrated and ulcerated, altogether as unpromising a case as could be imagined. Odynophagia and dysphagia were of the severest type, and amputation was reluctantly performed in the hope that the almost intolerable pain might perhaps be somewhat lessened. Despite every apparent reason to the contrary, relief was immediate, complete and permanent, and to the time of death, six weeks later, deglutition was painless and normal except for an occasional attack of coughing due to the almost complete destruction of

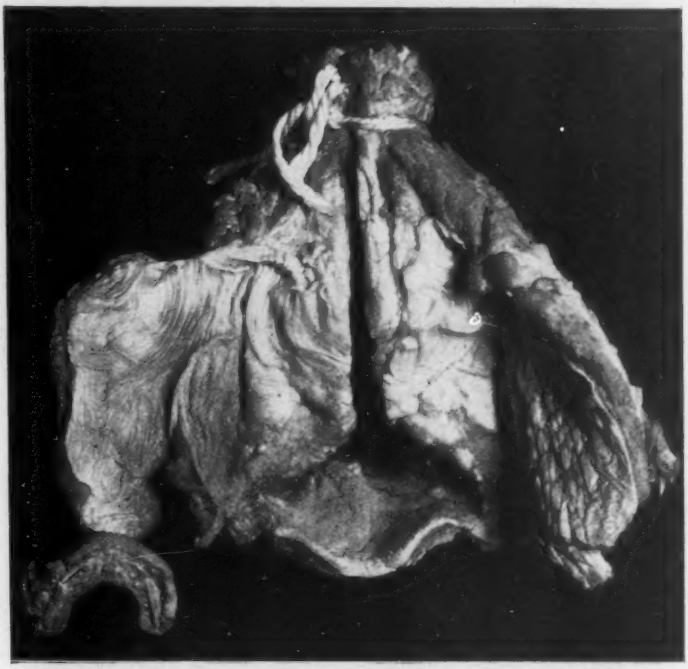


Figure 1. Extensive tuberculosis of the larynx. Two-thirds of epiglottis removed, with immediate, complete and permanent relief of pain. In six weeks the diameter of the stump receded from 11 mm. to 2 mm., at the end of which time microscopic examination failed to reveal any evidence of tuberculosis.

all parts governing laryngeal closure. Microscopic examination showed extensive necrosis of the arytenoids.

Both lateral margins of the stump were perfectly healed and normal; in the center only was there some remaining infiltration. This result was especially surprising in view of the fact that no attempt

had been made to remove the entire organ and the line of incision did not go as far as the lowermost ulcers.

Miscroscopic examination of a segment excised from the stump, after death, failed to show any evidence of tuberculosis. The specimen had the characteristics of diffuse adenoid tissue, with considerable fibrous tissue interspersed.

The chief purport of this paper, however, is not to direct atten-

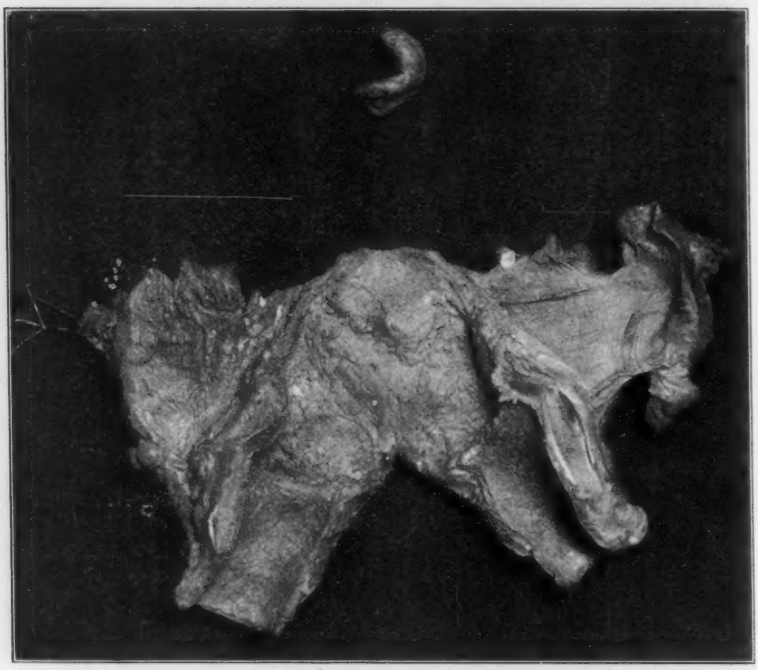
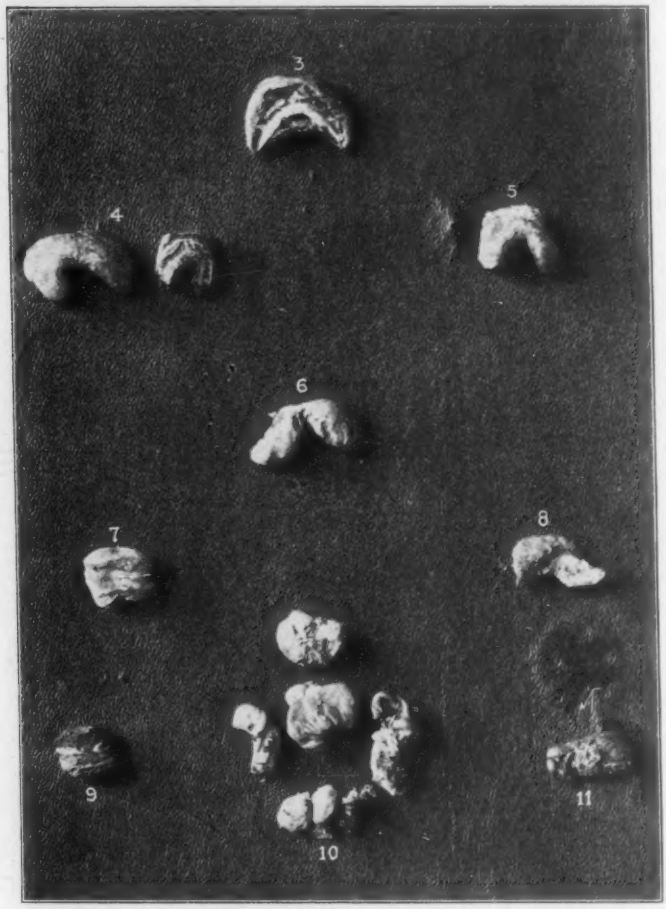


Figure 2. Interior view of larynx pictured in Figure 1, showing necrosis of the arytenoid cartilages, destruction of the vocal cords and ventricular bands, infiltration of the aryteno-epiglottidean folds, and large mass of granulation-tissue on the anterior wall.

tion anew to the palliative value of the procedure, although the relief of pain is necessarily the first desideratum, but to present the results in those cases in which the operation was undertaken chiefly with a view of attaining local cure. Preliminary to this report a brief review of the normal and pathological anatomy is essential, in order to show the reasons for the futility of the usual methods of treatment and the rationale of radical intervention.

The epiglottis is composed of a thin lamella of fibro-elastic cartilage, pitted on its lower surface with numerous depressions for the lodgement of mucous glands and blood-vessels, and covered by a



Figures 3, 7, 8, 9. Massive infiltration of the lingual surface of the epiglottis.
Figure 4. Rare condition of greater infiltration of the laryngeal as compared with the lingual surface of the epiglottis.
Figures 4, 5, 6, 10. Ulceration of the lingual surface of the epiglottis.

thick perichondrium, a sheath composed of fibrillar connective tissue which blends without distinct demarcation with the superficial layers of the cartilage.

The mucous membrane throughout is of the stratified squamous type; on the lingual surface it is separated from the cartilage by a wide stratum of areolar tissue but on the laryngeal side it adheres so closely to the perichondrium that it is difficult to separate. On the inferior portion of the laryngeal surface the mucous membrane contains so many lymphoid cells that it assumes the character of diffuse adenoid tissue, and in spots they are so grouped as to form distinct nodules. It is at these points the earliest epiglottidean foci would be expected to occur, a supposition supported by clinical and pathological observations. In only very exceptional instances, however, are specimens obtained at a stage of the infection sufficiently incipient to positively demonstrate this point.

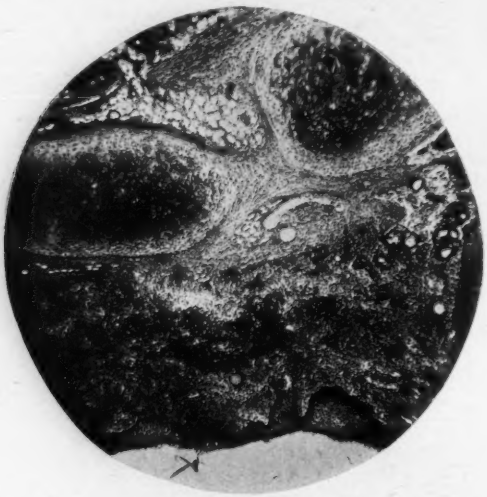


Figure 12. Submucous infiltrate of the epiglottis. Normal segmentation of the cartilage.

In two specimens, not showing other involvement of the epiglottis, the area about the tuberculum was infiltrated, and in several additional cases the tubercles at this point were the only ones with central degeneration.

An interesting and important fact in anatomy is that the cartilage is not composed of a single plate, but of several segments, usually three, each perfectly enveloped by perichondrium, the dividing trabeculae containing blood-vessels and occasionally mucous glands at either extremity. Masses of fatty tissue also extend part-way in

between the segments. (Figures 12 and 13). The significance of this conformation will be shown in discussing the pathology. The irregular structure of the organ explains several of the conditions found in tuberculosis.

Macroscopically it is seen that the cartilage seldom lies in the mesial plane, one side practically always being more infiltrated than the other; in incipient cases the process may be limited to the laryngeal surface, but when the disease is far or even moderately advanced, the lingual side is nearly always the thicker. Figures 3, 7,

Figure 13. Tuberculosis of the epiglottis. Granulation-tissue pushing through the perichondrium, with beginning necrosis. Interacinous infiltrate on the laryngeal surface. Normal segmentation of the cartilage.

8 and 9. (Figure 9 is reversed in the illustration). This condition was present in 18 of the author's last 20 cases.

Besold and Gidionsen claim that the laryngeal surface is the more infiltrated in every case, but that there are exceptions is shown by Figure 4.

As a corollary, the laryngeal surface is the one upon which ulceration soonest and most often occurs, for the tubercles in the confined area between epithelium and cartilage soon destroy the blood-vessels, with resultant degeneration and destruction of the epithelial surface. The oral surface, on the other hand, rarely becomes ulcerated until the infiltrate has attained massive proportions, unless

through direct extension from the free border. (Figures 4, 5, 6 and 10).

PATHOLOGY: The investigations of the author have led him to views at variance with those held by other writers on tuberculosis, in so far as they concern three vital points, i. e., the origin, frequency and nature of perichondritis and cartilage necrosis.

It is commonly held that these complications are exceedingly rare, and that even when the perichondrium is extensively involved the cartilage itself usually escapes. It is also maintained that these conditions, when existent, are the consequence of extensive and deep ulceration, and almost never result from an inclosed infiltrate.

Hajek has condemned the use of the term "tuberculous perichondritis" on the ground that the process is due entirely to the entrance of the germs of suppuration through an epithelium previously destroyed by tuberculosis, and Besold and Gidionsen while advancing the claim that a true tuberculous perichondritis and chondritis have been shown to exist, concede that the causative factor may be a preceding purulent inflammation which breaks through and into these structures and thus prepares the way for a later involvement by the tuberculous disease. They admit, however, the rare development of a primary tuberculous process.

These questions are of the utmost importance in their bearing upon treatment, hence extensive investigations were made to determine both the frequency and the true nature of each process. In all 41 tuberculous epiglottides were examined, the sections embracing the entire organ whether or not mascroscopic evidence of universal disease presented. Of the 41 specimens, 25 were ulcerative and 16 purely infiltrative; of the ulcerative cases the lingual surface was involved in 5. In 24 of the 41 specimens the perichondrium was invaded, either extensively or of one or more circumscribed areas, and in 15 of the cases of perichondrial disease the cartilage was effected. Thus 58.53 per cent of the cases had perichondritis and 36.58 per cent of the entire number and 62.5 per cent of the perichondrial cases showed evidence of either beginning or extensive cartilaginous involvement.

The discrepancy between these findings and those of other investigators is very great and cannot be explained adequately. It may depend on the fact that the deeper extensions are usually of miscroscopic foci, and that in consequence a large number of sections may be examined without uncovering the affected part: in this series the entire organ was examined and in many of the speci-

mens the deeper involvements were discovered only upon prolonged search.

The fact remains that in these cases both perichondritis and necrosis of the cartilage were of frequent occurrence, and that in eight of the specimens they were not the result of ulceration, but an accompaniment of a purely infiltrative process. The latter is a fact of great importance for it shows that no definite indication of the condition of the perichondrium is to be gained from a naked-eye examination.

As already described, both the cartilage and its sheath were found involved in a number of specimens that macroscopically ap-

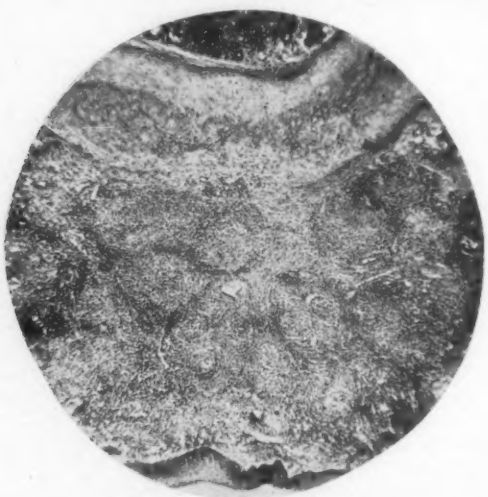


Figure 14. Submucous tubercles of the epiglottis and normal epithelium. A large tubercle is seen invading the perichondrium. The central portion of the cartilage is necrosed.

peared to be but superficially involved. Although a rapidly developing edema is highly suggestive, actual destruction of the organ, either as a whole or of certain segments, is the only infallible sign.

The process in the perichondrium varied within wide extremes. The greater number of the specimens showed only circumscribed points of cellular infiltration, these areas sometimes containing definite tubercles and giant cells. In others almost the entire sheath was invaded and thickened, frequently to several times the normal diameter. (Figures 14 and 15). In some instances the perichon-

drium was lifted up from the cartilage and the fibers separated into irregular layers—a condition most probably due to a mixed infection following ulceration of the epithelial surface, as every case with this condition was an ulcerative one. This type corresponds to that described by Hajek and others and is evidently the only form observed by them. Despite their claim that all cartilaginous foci originate in this manner, it can be positively affirmed that there is another form of equal frequency, primary in nature, that is purely tuberculous. In such cases the infection may be due either to a hematogenous invasion or extension from adjacent tissues.

A complete break in the perichondrium through which the tuber-

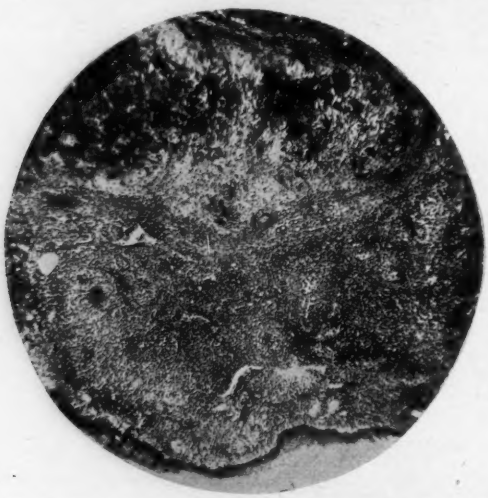


Figure 15. Extensive tuberculosis of the epiglottis, showing typical disease of the perichondrium and cartilage. The epithelium is normal.

culous granulation-tissue extends into the cartilage is shown in Figures 14 and 16. A like condition was present in three other cases, in none of which was there epithelial ulceration.

The view is also tenable that in some cases we have to do with a purely degenerative process due to complete obliteration of the nutrient vessels.

In 15 cases there was cartilaginous necrosis. The process in the cartilage generally involved microscopic foci only, showing the inherent resistance of the cartilage to the disease. In seven cases there were either multiple points of necrosis or single foci of large

size, the granulation-tissue, in the latter cases, occupying the entire width of the cartilage. Such a condition is shown in Figures 13, 15 and 17.

In nine of the secimens in which perichondritis was found, the interchondral trabeculae were also invaded. The entire trabecula was occasionally involved, the infiltrate passing through from one surface to the opposite one, the first focus usually appearing upon the laryngeal surface. The mucous glands, sometimes found at the extremities of the trabeculae, were distorted by an interacinous infiltrate, and the blood-vessels were often either partially or entirely destroyed. In most instances the infiltrate extended only as far as the layer of fatty tissue.

Figure 16. Tuberculous granulation-tissue in the perichondrium with necrosis of the underlying portion of the cartilage.

This condition, together with the dilated vessels so frequently found in the layer of tissue immediately below the tubercle zone, offers a valid explanation of the rapidity with which epiglottidean foci usually extend.

When these pathological changes are considered: the extensive infiltration of the entire submucosa; the obliteration of blood-vessels and glands; the infiltration and perhaps detachment of the perichondrium; the involvement of the interchondral trabeculae; the frequent areas of necrosis in the cartilage, and the common destruction

of the epithelium, the reasons for the futility of topical applications are manifest. It is highly improbable that such tissue can undergo resolution; even when the process does become quiescent it still exists and at any moment may be aroused into renewed activity.

To accomplish healing the parts must be given absolute rest, that is, totally deprived of function, hence the rationale of amputation. It has been proved that complete extirpation of the diseased tissue is not essential, although it materially shortens the period of heal-

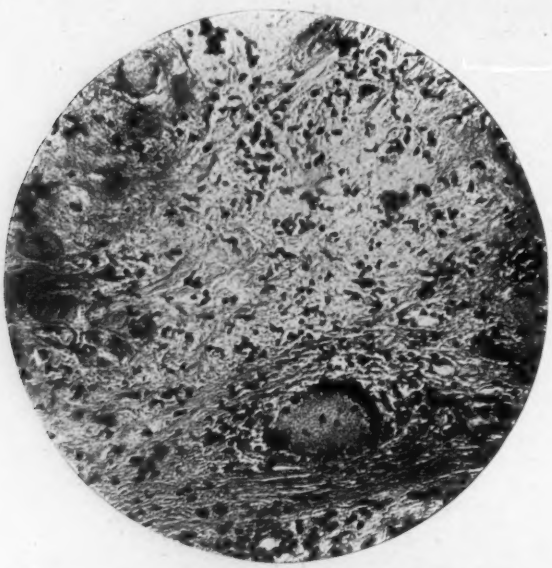


Figure 17. Tuberculosis of the perichondrium and cartilage. Almost the entire cartilage is replaced by tuberculous granulation tissue. High power of Figure 15.

ing. Even when universally involved, removal of the greater portion results in rapid recession of the disease in the stump.

Not being a vital organ no argument against removal can stand unless it can be shown that it does not exercise a curative and palliative influence, that the wound fails to cicatrize, or that the operation leads to further infections. Statistics bearing upon these questions are limitel, for there are recorded a few cases only, aside from those of the author, in which the operation was performed for other than purely palliative purposes.

In October, 1909, the author published the following analysis of all such cases then available:—(a) Cases favorable aside from the epiglottidean involvement: Number, 11; epiglottis healed, 11; larynx healed, 8; 3 still under treatment. Of the three cases then under observation, one recovered; one is improved both as to the lungs and larynx; and one succumbed to the pulmonary disease, but the larynx had steadily improved.

In this series, then, there is a percentage of 100 as regards healing of the epiglottis, and of 81.8 in cures of the larynx. Of these cases one has now been cured seven years; one, six years and two months; one, five years; three, between three and four years; four, between two and three years; and one twenty months.

(b). In the second class, cases considered unfavorable apart from the epiglottidean focus, there were 70 of complete healing of the epiglottis out of 83 operated, but in only three of these did the disease in the larynx entirely disappear.

(c) Of 40 unclassified cases the stump cicatrized perfectly in 25, the larynx in 8.

The entire 134, including the cases not then classed as successful, give the following results: epiglottis healed 107, or 79.85 per cent; larynx healed, 20, or 14.02 per cent.

Except in a few cases it is impossible to give definite data regarding the permanence of healing, for most cases soon pass from observation, but certain it is that the larger number sooner or later relapse in so far as the larynx is concerned. The epiglottis itself seldom shows a recurrence.

Of twenty additional cases, operated since the last report, the epiglottis was permanently healed in seventeen. One case, relieved of pain, returned to his home while there was yet an unhealed spot; one in whom there was concomitant pharyngeal ulceration had a recurrence in the stump after five weeks, and the third had a return of infiltration on the left side after eight months, when a second operation was performed. At the time of the first operation almost the entire larynx was affected; when the stump was again operated the disease had practically disappeared on the right, but on the left side the arytenoid and aryteno-epiglottidean fold were still greatly infiltrated. Several months later Dr. Gleitsmann subjected these points to electric puncture with considerable benefit, since when the larynx has remained quiescent despite rapid progression of the pulmonary lesions. (This patient died on March 2, of the present year, two years after the primary operation, of tuberculous broncho-pneumonia).

In this series, embracing several cases admittedly unfavorable to operative intervention, we can claim a definite percentage of 85 in cures of the epiglottis, and in two additional cases the stump has given no subjective symptoms. In nine of the twenty cases the larynx definitely improved.

Additional data can be adduced in refutation of the arguments that surgery must be ineffective because it cannot thoroughly eradicate the disease, and that further infection is favored by the opening up of the lymphatics. Theoretically these objections are valid but practical experience demonstrates their fallacy.

It is rare that the line of incision in epiglottidectomy passes beneath the invaded tissues, yet the stump practically always cicatrizes and regardless of its preceding amount of infiltration recedes rapidly to normal.

This point is beautifully demonstrated by a comparison of the stump with the excised segment shown in Figures 1 and 2. In a period of six weeks, during which practically no treatment was given, the diameter of the stump diminished from 8 to 2 mm., at the centre, and from 7 to 1 mm., at the margins, at the end of which time microscopic examination proved the disease to have completely disappeared.

In a patient now under observation, operated February 8, the stump has contracted from 11 mm. to approximately 2 mm. Six weeks later the right arytenoid and aryteno-epiglottidean fold were removed. In both instances healing was prompt although the patient was placed under the most unfavorable of conditions. Because of advanced kidney disease, the urine, loaded with hyaline and granular casts, amounting to but 25 ounces, he was confined to his bed, given an exclusive milk diet, and received 48 steam baths in 16 days.

Of 47 personal cases the stump healed perfectly in 40; in 7 there was delayed healing and in only 3 was there recurrence. In 44 additional cases, collected from various sources, local healing occurred in all but 2.

A total of 154 cases show the following results: Epiglottis healed, 124,—80.51 per cent; larynx healed, 29,—18.83 per cent.

The larger number of those recorded as unhealed concerned patients upon whom purely palliative operations were performed, and in whom death occurred before sufficient time for cicatrization had elapsed.

In not one of the author's 47 cases was there any recognizable unfavorable effect exerted either upon the lungs or the larynx, and

of 213 cases reported to him in personal communications, there was not a single instance of metastasis.

The claim is not made that the removal of this focus exerts a direct curative influence upon the larynx as a whole, but the assertion is warranted that a distinctly favorable effect is indirectly produced.

This improvement depends upon a number of factors: (1) A focus is removed that seriously interferes with correct treatment of underlying lesions; (2) the danger of extension by continuity is lessened; (3) cough and excretion of mucus are greatly decreased; (4) rest, both local and general, gained through the relief of pain, together with the resumption of normal feeding, result in a marked increase of vitality and consequent greater responsiveness to treatment; (5) marked subsidence of neighboring changes of a simple inflammatory nature.

These statistics, limited though they be, warrant the unequivocal assertion that amputation should be performed in every case of involvement regardless of the extent of the disease, local or constitutional, when odynophagia or dysphagia exists and can be ascribed, even though only in part, to the epiglottis; that it is likewise indicated and should be performed at the earliest possible moment in every case where there is anything beyond a sharply circumscribed focus, whether or not odynophagia exists, provided there is even a remote possibility of arrest of the complicating lesions. If the accompanying processes are advanced to a stage where arrest is improbable, amputation should not be performed unless the lesion gives rise to otherwise uncontrollable pain.

Some few cases even of widespread involvement will recover spontaneously or by reason of less radical treatment, but for every one so saved ten to twelve will succumb. Epiglottidectomy will save that one as well as an occasional case from among those who otherwise would die, and, in addition, will free practically all from the most harassing feature of the disease; the well-nigh intolerable odynophagia.

Metropolitan Bldg.

NEW INSTRUMENTS.

BY ALFRED BRAUN, M. D., NEW YORK.

A NASAL CHISEL-SPECULUM:—This instrument is used for removing the bony maxillary ridge in the submucous septal operation and also for removing septal spurs.

A chisel is incorporated into one of the blades of a flap-speculum. One blade of the speculum is shorter than the other. The shorter blade is grooved to allow the chisel to slide along it very freely.

The chisel-blade is used as the lower blade of the speculum, in removing the maxillary ridge. The chisel is drawn back, until the

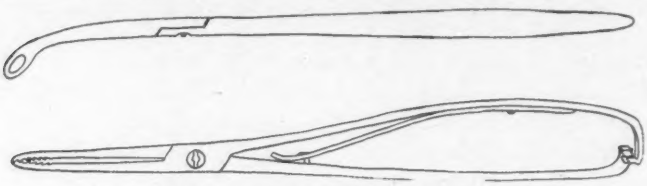


Figure 1. Tonsil grasping forceps.

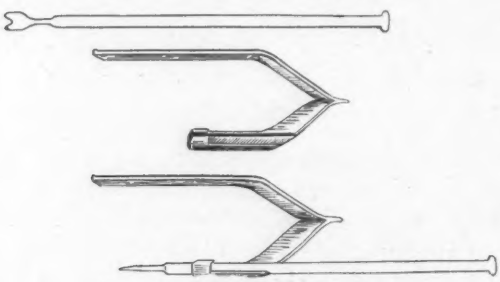


Figure 2. Nasal chisel-speculum.

upper blade of the speculum protrudes slightly beyond the end of the chisel. The speculum is then introduced between the flaps, and the chisel is made to engage the maxillary ridge. The hand then releases the speculum and grasps the shank of the chisel. The other hand is then free to manipulate the hammer. In this way the operative field is kept in full view and it is not necessary to have an assistant or nurse to do the hammering.

For the removal of spurs it is only necessary to turn the chisel quarter way around, or the chisel need not be turned, in which case, the entire speculum is rotated, so that the chisel lies against the septum.

A TONGUE-DEPRESSOR:—This tongue depressor is adapted for tonsil and adenoid operations when done under a general anesthetic.

In anesthesia operations, the tongue-depressor is usually held by the anesthetist, who stands behind the patient's head. The pull on the tongue-depressor is in a direction away from the anesthetist's body. The tongue usually offers considerable resistance, and the anesthetist's hand tires very quickly, in the effort to keep the handle from slipping. This tongue-depressor has two half-loops at the lower end of the handle, in the lower one of which the index-finger rests, and in the upper one, the thumb. This gives very excellent support to the hand, and makes it impossible for the handle to slip through the hand. The blade, at its junction with the handle, is raised, to allow it to override the lower teeth. At the

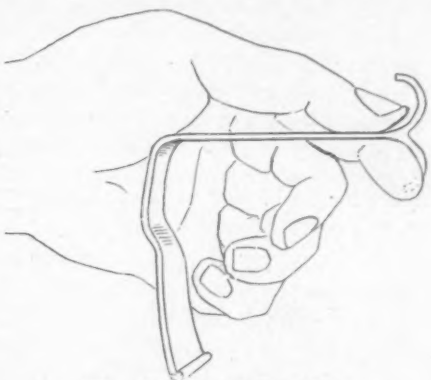


Figure 3. Tongue-depressor.

end of the blade is a transverse ridge, to prevent the blade from slipping over the tongue.

A TONSIL-GRASPING FORCEPS:—These forceps have been used by me for the past year and a half, with very excellent results, and a number of other men who have used them have expressed their satisfaction to me.

The handle is built on the principle of a needle-holder, and the blades can be released very easily by simply pressing the handle. The handle is narrow enough to allow the loop of the snare to be slipped over it very easily, and yet broad enough to enable one to get a firm grip on the instrument, so that it can be pushed firmly into the tonsil. The blade has small teeth which point backward, and hold the tonsil very firmly, with very little tendency to tear the tonsil-tissue.

616 Madison Avenue.

SPECIAL EDITORIAL DEPARTMENT

LARYNGEAL, BRONCHIAL AND ESOPHAGEAL ENDOSCOPY.

EDITED BY
CHEVALIER JACKSON, M. D.,
PITTSBURG, PA.

Influenzal Tracheitis.

Unfortunately the trachea is a borderline organ to which relatively little attention has been given. The laryngologist could, with his mirror, see a little of the upper portion, but he seldom attempted much in the way of study or treatment. The internist was more interested in the deeper air-passages and touched lightly upon it as of little importance. The general surgeon rarely operated upon it except to open it in tracheotomy, or to amputate it in laryngectomy. The direct method, however, has opened up a new field of study and the trachea and its diseases will be systematically dealt with in the laryngologic text-books of the future.

Of all forms of tracheitis, perhaps the least frequently differentiated as a morbid entity is influenzal tracheitis.

In a recent editorial, we mentioned this disease. When the author observed his first cases in 1889, he believed that he had discovered a new disease. Indirect methods yielded few and uncertain pictures of the tracheal lesions, and, indeed, none in the most interesting class of cases, namely those occurring in infants and children. The advent of direct methods of examination permitted of accurate observation of the clinical appearances of the tracheobronchial mucosa. A very good illustration made from the author's color drawing of one of these cases was published in the *Archives of Diagnosis*, April, 1908. The clinical appearances might be classified under a number of different types, but it has seemed to the author that the differences he has observed are really different stages of the same disease. The first stage has much the same appearance as in influenzal inflammation of the nasal mucosa at the same stage. The tracheal mucosa is reddened. Its color deepens. Swelling of the mucosa begins. Later, an exudate

forms, at first serous, then mucoid, then purulent and finally thick, tenacious and exceedingly difficult of expectoration even by the robust adult. In infants, who naturally are almost incapable of expectoration, death may occur from inability to rid the air-passages of secretion, (drowning of the patient in his own secretions). The bronchi or even the trachea itself may be occluded by mucosal swelling, or edema, actually causing death by the stenosis. Both these conditions are independent of broncho-pneumonia, which may or may not exist. The author has observed blood-clots on the surface of the inflamed membrane, without true hemorrhage, similar to those in nasal influenza, first described by D. Braden Kyle. Superficial erosions of the tracheal mucosa have been seen by the author in a number of cases. There is never any true adherent membranous exudate, on which alone the differential diagnosis from diphtheria can be made; and it can be made only by those who will look and see. By all means of inferential diagnosis, a severe case of influenzal laryngo-tracheitis cannot be differentiated from diphtheria, as it presents the same clinical picture, even to the adynamia. Direct inspection showing absence of a fibrous exudate will promptly decide, and corroboration by the laboratory from the specimens bronchoscopically removed will follow. A bronchoscope need not be inserted below the larynx. The glottis may be propped open with the tube-mouth or often the trachea can be clearly seen by use of the laryngoscope alone. In some instances, there seems to be but little laryngeal inflammation, the croupy cough being due chiefly to spasmodic conditions excited by the inflammation below.

The laboratory is seldom of aid if only secretions from the pharynx are sent. If the secretion is obtained by direct methods from the trachea, a reliable report nearly always can be had from specimens taken through the sterile bronchoscope which prevents contamination with oral organisms. Two typical cases will suffice to call attention to the disease.

Case 1. The author was called to see an infant, aged 7 months, suffering with extreme inspiratory dyspnea, with croupy cry and stridulous breathing, but no cough. The onset had been gradual, not nocturnal or sudden, two weeks before. Antitoxin had been given without relief. Pneumonia had been excluded by Dr. Boyce and laryngismus stridulus by an able laryngologist, who, however, pointed out to us evidences of a certain element of spasm in the case. Temperature 103°, pulse 130, respiration 32. The first glance at the larynx through the slide speculum showed it to be free from edema or other obstruction or even active inflammation. When the

bronchoscope was introduced, there was absolutely no cough, and during the entire examination, lasting about 5 minutes, there was not one single effort to cough. The tracheal mucosa was intensely inflamed, and there was a tenacious secretion adherent in scattered locations. This secretion was wiped away readily leaving no erosion nor bleeding. The bronchial mucosa was intensely inflamed in all the larger tubes; the smaller tubes were obstructed with pus which was moved to and fro in the respiratory current, but there was no coughing effort to expel it. Smears made from the sterile swabs passed through the sterile bronchoscope, showed an abundance of influenzal organisms (Dr. Ernest Willetts). There was a little streak of pus extending upward between the arytenoids, and out over the upper edge of the party wall. No anesthetic, general or local, was used and the child seemed in no way inconvenienced by the bronchoscopy. The child made a slow but complete recovery. The interesting points about this case are the inspiratory dyspnea without laryngeal obstruction; the total absence of the cough reflex; the severe tracheo-bronchitis without pneumonia; the bronchoscopic appearances of influenzal tracheo-bronchitis; the ease and certainty with which the laryngeal diagnostic question can be decided by direct laryngoscopy. It is interesting to consider what became of the endo-bronchial secretion. The inter-arytenoid streak was evidence of unimpaired ciliary activity, so that it seems probable that a portion of the pus was expelled in this way, the remainder being absorbed.

Case 2. A child of 3 years, became ill with all the clinical signs of diphtheria, adynamia, croupy cough, temperature 102°, pulse 110, respiration 30. Antitoxin was given but the child did not improve and on the sixth day it became extremely dyspneic. Intubation failed to give relief and a tracheotomy was required. This gave some relief for 24 hours when the dyspnea recurred, in spite of a well-placed and clean cannula. The author was called for a bronchoscopy. While preparations were being made, the child was brought into the operating room, extremely cyanotic and respirations soon ceased. The bronchoscope was quickly passed, masses of thick inspissated secretion were removed with forceps from the trachea at the bifurcation, and from the left bronchus, releasing a flow of pus from the left side. At intervals this pus was swabbed away, while oxygen was passed down through the bronchoscope during the inspiratory stage of the artificial respiration, the bronchoscope with the anesthetizing inlet being used, the thumb serving as a valve. In a few minutes the child could be trusted to do his

own breathing, and in about half an hour he left the operating room with good color, normal breathing and clinging to his nurse to whom he tried to talk. At no time during the bronchoscopy was there the slightest attempt at coughing. Diphtheria was absolutely ruled out by the absence of a membranous exudate. A cane-shaped cannula was used, and through it a successful effort was made to keep the air-passages free from secretion, so that oxygen could reach the lungs. The next day the cyanosis gradually reappeared. The bronchoscope was passed and it was found that this recurrence of the cyanosis was not due to masses of secretion in the larger tubes. They had evidently been efficiently removed through the cane-shaped tracheal cannula. The mucosal swelling had very much increased. Many of the smaller bronchi were seen to contain pus, which there was absolutely no coughing-effort to remove. Even the presence of the bronchoscope did not incite a single cough. The oxygen passed through the bronchoscope produced no effect on the cyanosis and the child gradually sank and died. The autopsy showed clearly that there had been an acute laryngo-tracheo-bronchitis. The small bronchial tubes were filled with pus. There were no evidences of pneumonia. No membranous exudate. No evidence of pleural disease. A few acutely enlarged glands were found at the bifurcation of the trachea, around the beginning of the left bronchus. Streptococci found in pus. Influenza organisms could not be found; but their presence at any stage of the disease could not be excluded. The interesting points are the uncertainty of diagnosis until direct laryngoscopy and bronchoscopy promptly and absolutely excluded diphtheria; the efficiency of the bronchoscope as a carrier of oxygen, and as an aid in the removal of secretions from the larger bronchi to permit oxygen to be passed to the lungs; the inefficiency of all human aid when there is no cough to clear the smaller bronchi; the intense acute purulent tracheo-bronchitis without pneumonia; the disappearance of the cough reflex which was present early in the case, the disappearance being probably due to blunting by the toxemia. While laboratory corroboration is lacking, the author and the others in the case felt justified in pronouncing the disease influenzal laryngo-tracheo-bronchitis because of the absence of pneumonia, the intensity of the inflammation, but especially because influenza was epidemic at the time. Of course, there were relatively few cases of the severity of this one and still fewer of the same degree of vulnerability. It is, of course, only in children that dyspneic cases with an absent cough reflex are seen; one reason for which probably is that greater activ-

ity, voluntary aid, and expectoration rid the system of the products of disease before the degree of toxemia that obtunds the cough reflex is reached. Be this as it may, there were during that epidemic a number of adults that had a degree of dyspnea. One such case occurred to the attendant of one of the consultants in this case. It is unfortunate that the technical difficulties connected with the bacteriologic diagnosis of influenza deprives us, in so many instances, of valuable aid. The absence of the cough-reflex while not diagnostic has been observed a number of times in influenzal tracheitis in infants.

Dr. John W. Boyce, who saw a number of these cases in consultation with us, unearthed an old French book published in 1828, that illustrates how the good in medical literature often is buried. (Nouvelles recherches sur la laryngo-tracheite, par P. Blaud, Paris, 1823). Dr. Blaud differentiates three forms of laryngo-tracheitis and gives a description of each that for accuracy of observation of clinical phenomena leaves practically nothing to add. He names the types, (1) laryngo-tracheite myxagene, corresponding to the common acute laryngo-tracheitis, ending with a mucoid or mucopurulent exudate; (2) laryngo-tracheite pyogene, corresponding to our acute purulent laryngo-tracheitis, usually according to the editor's observation, of influenzal origin; and (3) laryngo-tracheite meningogene, which corresponds to our diphtheria. The translation of the entire book would be a valuable contribution to modern medical literature, but for our present purposes it will suffice to mention that Blaud recognized an epidemic laryngo-tracheitis, which came in waves; which was more severe in those who never had had it before, and in the earlier cases in each epidemic; which was characterized: by a râle which showed the presence in the trachea of a thick secretion; by the expectoration of purulent secretion or its accumulation in the trachea; by its occasionally fatal termination; by the finding post-mortem of pus in the trachea and bronchi, but no pseudo-membrane and no pneumonic lesions. Its contagious and infectious nature, Blaud did not seem to recognize; though he refers to certain phases of its epidemic character as being similar to variola and other diseases then known to be contagious, which marks Blaud as a remarkable observer and thinker, and which also marks as influenzal this group (No. 2) in his classification of kinds of laryngo-tracheitis. As Dr. Boyce pointed out to the author, diphtheria was not then known to be contagious or infectious. It seems that many of the "catarrhal epidemics" and "suffocative catarrhs" of the time were influenza, but they were not so distinctly a laryngo-

tracheo-bronchitis without broncho-pneumonia. It is probable that many cases of influenzal tracheo-bronchitis of the severe type in children are diagnosticated pneumonia, especially broncho-pneumonia; and that many cases of influenzal laryngo-tracheitis are erroneously diagnosticated diphtheria. Prior to Blaud's day these cases were considered a stage of membranous croup (diphtheria) in which the membrane had broken down. Blaud devotes a large part of his book to the proof of the fact that they are distinct diseases.

The laryngologic and the thoracologic text-book of the future, must include influenzal tracheitis, and the laryngologist of the present must not make his diagnosis of infantile laryngeal disease by the fact that the patient has neither died of the disease nor recovered under anti-toxin. If we, as laryngologists, are to make infantile laryngo-tracheal diagnoses by inference instead of by looking and seeing, we cannot hope to do as good work as Blaud did with his stethoscope and his brains in 1823.

The Faucial Tonsils, with Especial Reference to Their Removal by Enucleation. FRASER. *Edin. Med. Jour.*, July, 1911.

After giving some account of the anatomy, physiology and pathology of the tonsils, the writer proceeds to discuss the indications for tonsil operations. He believes that in cases of simple chronic hypertrophy where the tonsils are pedunculated, the guillotine operation is quite sufficient. In cases of recurrent tonsillitis and peritonsillitis, in which the tonsils are submerged, and in cases of tubercular cervical adenitis, enucleation is called for. The operation of enucleation is discussed in detail. The author employs a uterine vulsellum, a pair of blunt-pointed scissors curved on the flat, and a long probe-pointed curved bistoury. For adults he prefers local to general anesthesia. Among 120 cases of tonsillectomy he has had two of moderately severe hemorrhage, but none of sepsis.

GUTHRIE.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.

SECTION OF LARYNGOLOGY AND RHINOLOGY.

Regular Meeting, October 25, 1911.

LEE M. HURD, CHAIRMAN.

Case of Amputation of the Epiglottis. By EMIL MAYER, M. D.

DR. MAYER said that there were some interesting features in this rather unusual case. The patient, a man 64 years of age, came to the clinic of the speaker in April, 1910, with a great deal of dyspnea due to an acute edema of the larynx and pharynx. He was referred to the hospital where a tracheotomy was hurriedly performed. The inflammatory conditions gradually subsided after a time and the tracheotomy tube was removed; the breathing became obstructed within a very short time and the tracheotomy tube was promptly replaced.

DR. MAYER was then asked to ascertain the cause of the recurring obstruction and he reported that there was an involution of the epiglottis, evidently following the inflammation, so that it was impossible to see the interior of the larynx without cocainizing the epiglottis and raising it up; and that this involution prevented free respiration and the removal of the tracheotomy tube. The patient was discharged from the hospital and subsequently reappeared in the speaker's clinic in the out-patient department.

Some granulations appeared within the larynx, and these were removed and divulsive measures used. The patient was then referred back to the hospital for operation with a view of removing the tracheotomy tube permanently. While in the hospital, he developed symptoms of a paraplegia due to an abscess-condition about the seventh dorsal vertebra, and he was transferred to the neurological department.

In May, 1911, with the assistance of Dr. Yankauer, the speaker removed half of the overhanging epiglottis and the tracheotomy tube was removed a few days later, the patient swallowing with very little difficulty after the operation. For a few days the breathing was distressed as the patient had become accustomed to the easy influx of air through his tube; nevertheless the tube was

not replaced. Subsequently some low granulations were removed and the patient coughed up a ring of cartilage.

The patient was exhibited, spoke in a clear voice, showed perfect freedom of respiration and declared in a clear voice that he had gained thirty-five pounds in weight since the operation upon his epiglottis and removal of his tracheotomy tube, now six months ago.

DR. MAYER said that the interesting points in this case were the unusual cause of stenosis preventing the removal of the tracheotomy tube, and the ease and comfort in deglutition with one-half of the epiglottis removed.

As to the cause of his original edema, as also his spinal conditions, the speaker was entirely at sea, tuberculosis being excluded after repeated tests. The instrument used for the removal of the epiglottis was an oval tonsillar punch bent at an obtuse angle.

DISCUSSION.

DR. SEYMOUR OPPENHEIMER spoke of the method suggested by Lockard for amputation of the epiglottis, namely the cold wire nasal snare. He has employed this method in a number of cases and it works very satisfactorily. It cuts through nicely, leaving a clean stump, and there is very little reaction at the time of the operation.

DR. MAYER replied that the method of using the snare is undoubtedly a good one when there is a puffy edematous epiglottis, where everything should be removed.

In a case of this kind he preferred the punch which would remove just the part desired with the aid of the laryngeal mirror.

In this connection, Dr. Mayer called attention to the value of the removal of the epiglottis in tubercular patients whose terrible dysphagia is thus promptly relieved, rendering the last days of these unfortunates much more comfortable.

Case of Traumatic Aneurism of the Carotid Artery. By T. J. HARRIS, M. D.

DR. HARRIS said that this was not a strictly laryngological case, but he presented it because of the added interest which the skiagraph showed. The little boy came into the Manhattan Eye, Ear and Throat Hospital a few weeks ago because of a swelling in the neck, which many of the members had seen. A very brief history was given. He was asleep on the fire-escape of a tenement house, and all of a sudden he was struck and something entered his neck. He was taken that night to a hospital. On looking at the skia-

graph, at the lower end of the swelling, the scar from the bullet could be seen. The swelling showed all the symptoms of a large aneurism, which must be of the common carotid artery.

The history given pointed to the fact that he had been struck by a bullet from some sort of fireworks, probably from a skyrocket. Dr. Law, the skiagraphist of the hospital had been asked to take a picture, not with the idea of locating the bullet but for the purpose of getting a good picture of the aneurism. The aneurism, however, failed to come out, but there was a most beautiful picture of the bullet *in situ*, lying between the seventh cervical and the first thoracic vertebrae.

DISCUSSION.

DR. MAYER called attention to the work of Dr. Abrams of San Francisco, who recommends a form of massage for aneurisms which seems to be followed by some wonderfully happy results. In the case presented it would seem to be a method worthy of trial as one could note the beneficial results.

DR. FREUDENTHAL replying to Dr. Mayer, said that he considered the method a very dangerous one. He had never tried it himself, as he would not care to risk it. The following case may be a warning. It occurred in a patient who complained of hoarseness. Paralysis of the left vocal cord was found and as the chest was being examined in the presence of several colleagues by digital percussion, the patient fell down, and died within a few seconds.

DR. MAYER said that Dr. Freudenthal's patient would in all probability have died without that gentleman's examination and it did seem that in view of our helplessness as regards aneurisms, the method was deserving of a trial.

DR. JOHNSON said that he thought the treatment of such conditions hardly came within the domain of the laryngologist and that such a case should be turned over to the general surgeon if anything was to be done in the way of percussion or by any other form of treatment. The treatment of an aneurism is a very dangerous procedure, whether by injection of iodin, insertion of silver wire, percussion, or by any other method, external or internal which has for its object the formation of organized fibrous material within the aneurism or its walls. These forms of treatment frequently result in the formation of migrating blood-clots which endanger the patient's life.

DR. HARRIS said that he hoped that a little later the members might have a chance to see the picture of the bullet. He had not

thought that this modern method of treatment or any other would be advisable, but since Dr. Fraudenthal had pointed out the dangers he would have still greater hesitation in trying it. The patient is not suffering from any special symptoms or any great trouble.

Replying to a query from Dr. Johnson as to whether or not the growth had increased in size, Dr. Harris said that he was not clear on that point, but his impression was that there had been no particular change in the last few months.

Tumor of the Larynx. By S. W. THURBER, M. D.

The patient is a native of Austria, 60 years of age, and has lived in this country for the past ten years. He has been a peddler, although his wares have not required him to shout—he has not overused his voice. He came under observation at the Vanderbilt clinic on October 1, complaining of hoarseness which had existed for five weeks, coming on gradually, but for the last three weeks associated with pain on the left side of the neck, radiating to the ear. He had never been sick, and had never before consulted a doctor. So far as the history goes, it is negative. On looking for the cause of the loss of voice and hoarseness, one sees an involvement of the left true and false vocal cords, with immobility and some thickening just in front of the left arytenoid cartilage. This infiltration also involves the posterior one-fourth of the right vocal cord. The condition is associated with a large nasal polypus, which does not seem to bother the patient. The Wassermann reaction was negative. No examination for tuberculosis was made, but his lungs show no sign of any such condition. He has been taking 120 grains of potassium iodid daily for a week, with a slight lightening of the color of the growth, and a slight diminution of the pain though not of the size of the growth. He was presented for diagnosis and suggestions as to treatment.

DISCUSSION.

DR. MAYER said that he had no doubt that the growth in question would prove to be malignant and that all other probabilities had been eliminated. It remained, therefore, to suggest that the patient be informed of the probable nature of his condition and his consent obtained to the performance of a radical operation, if upon removal of the growth it was shown to be malignant. In this case while the growth appears to be one-sided it might show itself upon operation to have extended over to the other side, and if so, the entire larynx should be removed.

DR. LEDERMANN told of an experience of his, dating about a year back, with a patient, a man of about 52 years of age, who had a condition of hoarseness without pain and without positive history of specific infection. Examination revealed a growth on the posterior third of the right vocal cord, with considerable infiltration of the false cord of the same side. There was motility of the cord. Although the man gave a vague history of having had some sort of an infection many years previously, he was given the benefit of the doubt and placed on the saturated solution of iodid of potash until he was taking 100 drops t. i. d. Mercurial injections were also given, without any change in the condition. The Wassermann reaction was negative. After such vigorous anti-syphilitic treatment, it looked like a malignant growth. Its serious character was so evident that the man was referred to two other colleagues who also thought the case malignant. He was finally referred to a surgeon, who said that having had all this treatment with no improvement he would advise a laryngectomy or a hemi-laryngectomy. The man refused to have his larynx removed. He was feeling very well, but the growth was evidently increasing in size. In the meantime, active medication was stopped except for small doses of iodid. In two months the man returned with the growth almost gone.

We cannot tell macroscopically whether or not these lesions are malignant. No section was removed. Four different men observed this case, and all came to the conclusion that it was malignant.

Some time ago Dr. Gleitsman wrote a paper on the spontaneous disappearance of malignant growths, and stated that these growths should be studied carefully and with regard to whether they are malignant or some form of infection, and suggested that further attention be given to this important topic. Up to the present time, over a year has elapsed, and the patient has remained in good health without any return of his laryngeal trouble.

DR. THURBER said that his clinical diagnosis was epithelioma of the vocal cord. If it were in his own throat he would not have a piece removed for examination, for if it proved to be malignant he would let it go, as it is of such wide extent that an operation would mean total laryngectomy and he did not consider the post-operative condition, in cases of this character, preferable to non-interference.

DR. HARRIS said that he did not think we should lose sight of Dr. Erdmann's contribution made within a year and the statistics given by Dr. Chevalier Jackson, showing that the results of the total removal of the larynx present an unbroken gloomy picture. All the

favorable results are from hemi-laryngectomies, the Semon method. That is the only bright side of laryngeal work. The total removal is as black a picture as may be. He did not feel that he could speak of it as enthusiastically as Dr. Mayer did. It is very probable that on operating, a much more general involvement would be found than now appears. He was more inclined to agree with Dr. Thurber.

DR. MAYER asked if he was correct in understanding Dr. Thurber to say that if examination showed the growth to be malignant he would prefer not to have anything done.

DR. THURBER assented and said that he did not think the man would suffer more than by having his larynx out.

DR. MAYER asked about those cases which were operated upon three and four years ago and even more, and whether they were still alive; such cases were shown by Drs. Brewer, Moschcowitz, and others. He did not feel optimistic about these cases, but he could not endorse the gloomy view put forth by the gentleman who presented the case. It was impossible in the few brief moments for discussion to go into the detail of any plan of treatment, but after proving a case to be malignant some one sufficiently competent should undertake the radical operation immediately thereafter, and in any event we should be allowed full scope to proceed as far as the exigency of the case requires.

DR. DOUGHERTY said a personal equation came in. Dr. Thurber had spoken of how he himself would feel were he the patient. It was an awful thing to contemplate the sufferings and lingering death of these cases of carcinoma of the larynx. He had seen dozens of them. He probably has the largest service of that character in the city, and it was seldom that they could get a chance to operate for such cases. The patients will not consent. For his part he was inclined to advise operation. If the patient die under the operation he is saved weeks or months of suffering, and if it should be successful he has a chance for his life. Cases have been reported and shown by Drs. Bodine, Solis-Cohen, and others where a complete laryngectomy was done, and yet the patients could pronounce enough words to make themselves intelligibly understood, and were fairly comfortable. A hemi-laryngectomy was best where there was only a partial involvement, but we should not hesitate to operate ourselves or call in a competent general surgeon where the larynx proved to be completely involved. He had seen a patient get on the the table saying that if it did not prove a success he wished to die under the ether, and that would seem to be the cor-

rect feeling. The patient wanted every chance, but did not wish a suffering and lingering death. When a section of the growth has been removed, one should be prepared for almost immediate operation,—not perhaps at the same operation, but certainly within a few days, for these cases spread like wildfire. He had seen several cases where sections were removed, and before much could be done for them they were beyond help; whereas if they had been let alone or had been prepared for immediate operation the treatment would have been more scientific and logical.

Specific Deformity of the Nose. By W. W. CARTER, M. D.

DR. CARTER said that he presented this case chiefly to show one of the classes of deformity of the nose which he believes to be amenable to the transplantation of bone, as in the manner previously described by him, but which cannot be corrected by any other method of which he knows.

The patient, a young woman, came under observation last March. At that time the Wassermann test was positive, although there was no history of her having been infected at any time, either through heredity or personal contact. The disease began about eight years ago. She first noticed a very profuse discharge of a purulent, foul-smelling fluid from the nose, and a short time after that the nose began to fall in at the bridge. Later, she noticed several large pieces of bone and cartilage that came away. The deformity became very pronounced, and about three years ago paraffin was injected into the bridge. For a short time the result was fairly good, but a little later the skin at the side of the nose and also over the bridge began to atrophy, so that now there is a nodule of paraffin presenting at that point which looks as if it were going to slough out. The intra-nasal deformity is very marked. There is only one large cavity lined by cicatricial tissue. Her atrophic rhinitis is better now because of the treatment she has been receiving. The alae have collapsed, the nostrils being merely buttonhole-slits. Whenever she attempts to take a deep respiration through the nose, the nostrils close completely. Cases of this kind are very formidable. Almost nothing has been done for their relief.

Up to the present time, Dr. Carter has operated on nine cases by bone-transplantation, and three of them were syphilitic cases,—two of which were almost as bad as this one,—and has secured very good results. In this case, he proposes to take out the paraffin and insert a piece of the patient's rib, in the manner which he described before the section nearly two years ago. He first makes a

semilunar incision between the eyebrows, reaching down to the bone; through this he elevates the skin and subcutaneous tissues over the nose. A piece of the patient's ninth rib, about two inches long, is then inserted, one end reaching almost to the tip of the nose, the other end being anchored under the periosteum over the naso-frontal process. In most of the non-syphilitic cases there is a certain amount of nasal bone remaining, which acts as a fulcrum, the lever being the tip of the grafted bone which lifts up the nasal tissues. In this instance there is practically no fulcrum, so he will endeavor to anchor the bone-graft beneath the periosteum over the naso-frontal process, and then insert extra pieces of bone, one on either side, so that they will rest upon the superior maxilla external to the nasal notch, and bring them together in a V-shape, letting the dorsal piece rest upon this pier. He did this in one case and the operation was very successful. He had showed the patient,—who was referred to him by Dr. Harmon Smith,—before the section last spring.

These cases are not considered suitable for paraffin because the tissue is filled with cicatrices and because of its poor resistance to the presence of a foreign body. Furthermore, there is nothing to support the paraffin, so that it practically adds to the weight where there is nothing to hold it up.

DR. CARTER said that he intended to operate on this case as soon as it had undergone sufficient anti-syphilitic treatment to warrant securing a good result.

In response to an inquiry from Dr. Edgerton, Dr. Carter drew a diagram and explained more clearly just what he proposed to do in the operation.

Dislocation of the Atlas from the Axis of the Vertebra. By F. M. LAW, M. D.

DR. LAW apologized for bringing a case of this character before the section, but said that it was such a remarkable one that he thought the members would be interested.

Three or four years ago the patient, a man, had fallen off a car, and later developed a lateral curvature of the thoracic spine so that he had to wear a brace. Last December, in going out of his house he slipped, his feet going from under him, so that he fell in a sitting position. He got up, feeling no discomfort—his neck being held stiff by the brace he wore—and went about his business for some three weeks. Then some one noticed a swelling on the back of his neck and he went to an orthopedic hospital for advice. There

the case was diagnosed as a dislocation or fracture of the cervical vertebra, and he was fitted up with a jury mast, which he wore for six months. He still wears it at night. Eventually he fell into the hands of an osteopath, who referred him to Dr. Law for an X-ray picture. The man has complained of no symptoms, excepting a slight difficulty in swallowing, a slight hoarseness of his voice, and very limited motion of the head.

The radiograph shows a marked dislocation between the atlas and the axis, with a backward rotation of the spine from the first to the seventh vertebra; the spinal process of the seventh cervical vertebra is fractured, allowing it to tip far back. On examination there seems to be a mass of tissue, looking like the epiglottis, very much swollen. The man has a very limited action of the jaw, and cannot open his mouth wide enough to permit a satisfactory laryngoscopic view.

DISCUSSION.

DR. THURBER said that he had only that afternoon seen a case of a man who was a very hard user of alcohol up to two years ago. Three years ago on the front half of his tongue a good many of these spots developed. When they start bleeding there is a good deal of trouble in stopping them. There are no other spots on his body, and no petechiae on his skin anywhere.

Report of Three Cases of Foreign Body in Bronchus. By SIDNEY YANKAUER, M. D.

(To be published in full in a subsequent issue of THE LARYNGOSCOPE*).*

Foreign Body in the Sphenoidal Sinus. By A. P. VOISLAWSKY, M. D.

N. W., physician, aged 38, came under my care the latter part of January, suffering with pan-sinusitis. On January 25, 1910, the right middle turbinate was removed; on January 31, the left middle turbinate was likewise removed; on February 1, the ethmoidal cells were curetted. These operations were done under cocain. About this time while local applications were being made to the sphenoidal sinus the cotton became detached from the applicator, and diligent search failed to recover it. I was called out of the room, and upon my return the nurse in charge showed me a piece of cotton which the patient had blown from his nose during my absence. Thinking it was the lost swab, no further attention was given to the matter at the time.

The patient left the Manhattan Eye, Ear and Throat Hospital in a few days very much improved. However, there was a slight pusy

discharge noticeable every morning. He spent July and August on the Labrador coast, and thought that perhaps the climate had something to do with the discharge. In October, 1910, after returning to New York, while blowing his nose violently one morning he discharged a piece of cotton, which upon examination showed that it had been rolled on an applicator. There has always been a question in my mind as to whether or not this was the swab that I lost the previous February, as I am certain that the nurse in charge could not have been mistaken about the cotton being blown out of the patient's nose at the time of the operation.

On April 22, 1911, having a rather bad cold in the head, this same patient in trying to reduce the hypertrophied mucous membrane in the right nostril, and wishing to relieve a central headache, swabbed his nose with adrenal solution, and lost the cotton in the right sphenoidal sinus. Being unwilling to have a portion of the sinus wall removed with the instruments that we rhinologists use, he devised these two little instruments (showing them), the one to bite off a small portion of the anterior sphenoidal wall and the other to grasp the lost cotton swab. Armed with these two instruments, on May 22 he walked into my office. Upon examination, I found that the natural opening of the sinus was large; so the punch-forceps was not needed. I managed to pass the doctor's improvised forceps into the sinus, but failed to bring out any cotton. I next passed an aural hook, and upon its withdrawal some cotton shreds adhered which convinced me that the doctor's diagnosis was correct. At the next manipulation I brought out the cotton swab that had been in the sphenoidal sinus for thirty days.

Report of a Case of Laryngeal Tumor: Drawing and Specimen. By T. J. Harris, M. D.

Dr. Harris said that this was one of the most remarkable cases that it had ever been his privilege to see, and that it was as baffling to him to-day as when he first saw it. He had the specimen to show, and a very beautiful drawing which Dr. Braun had prepared of the larynx before it was opened for microscopical examination. At his request Dr. Wright, the house surgeon at the Manhattan Eye and Ear Hospital had prepared a history of the case, which with the permission of the chairman he would read, while the specimen was being passed around:

The case was a child, 7 months old, who was brought to the hospital because of inability to cry, which had existed since birth. The mother stated that the child had no difficulty in nursing, and it seemed otherwise well. Examination showed the child rather poorly nourished, exhibiting

no signs of dyspnea. It breathed with closed mouth; a probable laryngeal obstruction was suspected, with the presence of an adenoid, and the mother was advised to bring the child into the hospital for examination. No history of specific disease in the parents could be obtained.

Through a mistake, the child was not admitted for a week after the first visit. At that time there was no particular change in the condition. A few hours after admission, however, pronounced dyspnea developed, requiring a quick tracheotomy. This entirely restored the breathing, and the child did well for a short time after. Soon, however, symptoms of secondary pneumonia developed, and the child died twenty-four hours later. No autopsy was permitted; an opportunity was taken to remove the larynx, which has been presented for inspection. An examination of this shows a most unusual and interesting picture. The rima glottidis is completely obliterated above by a swollen and papillomatous-like mucous membrane and below by an overgrowth of the cricoid cartilage. A microscopic examination of the soft tissue was made by the pathologist of the hospital but no evidence of syphilis was discovered.

The exact condition present is puzzling. It seems almost incredible that the narrow space present would have permitted air to pass through at the time that the child was first seen, or later. With such data as the specimen affords, the only diagnosis possible is a congenital deformity of the larynx.

DR. HARRIS said that he would like to add a single word about the salient features of the case. First, when the mother brought the child to the clinic last August her only complaint was that the baby was not able to cry. It nursed all right.

There seemed to be a distinct obstruction in the neck. Was this simply a congenital condition, a congenital stenosis or stricture? The cricoid seemed to be overgrown, and there was no passage that we could get through. Leaving aside congenital syphilis, he did not know what to think about it. When seen after tracheotomy, the child was sleeping quietly. There seems no question but that the death resulted indirectly from the operation in the usual way, i. e. pneumonia. If any one could suggest anything, he would appreciate it very much. He had been trying to find out something about congenital syphilis of the larynx, but had not found anything. He had thought of a possible papillomatous condition, but that had been excluded. The larynx was stopped up, edematous, very boggy, and yet the chief trouble was not in the upper portion of the larynx but the lower portion.

Multiple Hereditary Telangiectases of the Tongue, Septum, and Inferior Turbinates: With Recurring Hemorrhages. By C. D. VAN WAGENEN, M. D.

DISCUSSION.

DR. FREUDENTHAL said that he has two cases under treatment, one of which reminds him very much of the case shown by Dr. Van Wagenen. The two cases are as different as possible. The first is a physician, 55 years of age, who has had a bleeding from the

nose for the last ten or fifteen years. He spits out blood every morning, and thinks that it comes from his teeth. There is some blood from the teeth, but very little. It comes mainly from the nose. It is impossible to say whether or not he has any enlargement of the veins of the face or elsewhere, because of the extraordinary redness of his face and the congestion of the mucosa.

The other case is just the opposite. The man is 43 years of age and very anemic, and you can see the petechias of the nose, face and tongue. This man has had lues, but he bled from his nose long before he acquired it. He claims that he has had epistaxis since he was 6 years of age.

Dr. Freudenthal said that he had spoken of these two cases before a general medical society and asked for suggestions as to treatment but could get none. The second case has a slight leucocytosis, while the first one had 10,000,000 red blood corpuscles. It seems evident that these cases can never be cured by local applications alone. The cause of the trouble lies in a mechanical change of the blood.

New Instruments. Presented by A. BRAUN, M. D.

(Published in full in this issue of THE LARYNGOSCOPE, *p. 128.)*

Laryngeal Paralysis in Diseases of the Medulla Oblongata; the Law of Semon. BELA FREYSTADTL. *Arch. f. Laryngol. u. Rhinol.*, Bd. 25, Heft 1, p. 90, 1911.

Referring to the histological examinations of A. Kahn, who found the peripheral fibers affected first in tabetic recurrent paralysis, Koerner positively refuses to accept the corrections of Semon's law. The writer, after citing two cases of syringomyelia, sustains the Semon law as absolutely correct in this disease, (Semon declares that abductor paralysis is found first in all progressive organic disease of the recurrens or its medullary nuclei). The laryngeal paralyses found are due to medullary disease, the cricoarytenoid, post-fibers being most vulnerable, are first affected. In syringomyelia, the glossis and cavity-formation show a regularity of localization. If this be true, the presence of adductor paralysis does not contradict Semon's statement. STEIN (KLEENE).

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY.

Seventeenth Annual Meeting, Atlantic City, June 1, 2 and 3, 1911.

CHEVALIER JACKSON, M. D., PRESIDENT.

(Continued from Page 80.)

The Method of Giving Anesthesia in Operations Upon the Upper Respiratory Tract. By JAMES TAYLOR GWATHMEY, M. D.

The surgeon about to operate upon some portion of the upper respiratory tract may select from such a variety of agents and methods for inducing and maintaining anesthesia that the question of safety and after-effects may be absolutely eliminated.

The agents for local anesthesia are cocain and its many allies, and morphin, ethyl chlorid, and sterile water. Morphin should precede cocain whenever possible, rendering the latter safer from inhibatory reflexes, improving the anesthetic, and removing the psychic element.

The general anesthetics are nitrous oxid gas, ether, ethyl chlorid, anesthol, chloroform, morphin, and in emergency cases, alcohol in the form of whiskey or brandy, combined with morphin.

The methods employed were enumerated as follows: spinal analgesia; rectal anesthesia; intravenous anesthesia; regional analgesia; morphin anesthesia; combined local and general anesthesia; hypnotism or mental suggestion combined with some other method; the sequestration method; intra-tracheal anesthesia; pulmonary anesthesia by the nasal or oral route, and electrical anesthesia (one case recorded in human being).

The scientific basis for the successful administration of all pulmonary anesthetics consists, in addition to the usual preparation of the patient, of: (1) some preliminary medication; (2) anesthetic so arranged that any sequence or combination can be quickly made without interfering in the slightest with the operation; (3) all anesthetics heated to the temperature of the blood; (4) combined with oxygen when indicated; (5) apparatus so constructed as to be able to administer the gases or vapors under normal atmospheric pressure or positive pressure and with moisture.

Dr. Gwathmey emphasized the value of preliminary medication. Given 30 minutes before the operation, it quiets a patient, as indicated by the normal heart-sounds; shortens the period of induction,

abolishes unnecessary reflexes and blunts others; diminishes the amount of the anesthetic one-third to one-half; renders holding and strapping unnecessary; diminished the secretion of saliva to a negligible quantity; and allows the patient to come out of the anesthetic quietly and naturally. A pint or two of normal saline solution given per rectum five or ten minutes before the close of the operation and while the patient is still in full surgical anesthesia, relieves post-anesthetic dryness of the mouth and thirst, brings the patient out strong, and usually with no disposition to vomit. In the majority of cases the narcosis should be induced with nitrous oxid and oxygen, the continuance of this combination depending upon the exigencies of the case. If a change is indicated an even narcosis can be maintained with warm ether or chloroform, and oxygen. The final stages of any operation lasting an hour or more should be nitrous oxid gas and oxygen. When this plan is followed, in over 90 per cent of all cases the patient suffers no unpleasant after-effects.

Laboratory experimentation and clinical experience on his own part substantiated by that of others, established the value of the method of giving warm ether or chloroform vapor, combined with oxygen and passed through water to purify it. It is yet to be proved that any pathological changes follow the administration of warm chloroform vapor with oxygen.

The mastoid operation is the easiest from the anesthetic standpoint, deep narcosis being necessary only in the initial stages. For the submucous operation, the Rose position, with warm chloroform vapor and oxygen is preferable when a general anesthetic is to be given.

Dr. Gwathmey outlined briefly the methods of giving anesthetics employed in various hospitals visited by him. While he had purposely refrained from going into detail regarding any given method, and had refrained from the positive advocacy of any special procedure, he said, with reference to pulmonary anesthetics in general, that the narcosis is always under control, and may be modified according to the exigencies of the case. In the event of hemorrhage or shock, the amount of anesthetic may be lessened, and the oxygen increased, thus keeping the pulse and respiration as nearly normal as possible. If, as the operation is drawing to a close, the pulmonary anesthetic is withdrawn, the patient will be practically out of its influence by the time the operation is completed. The preliminary medication and the raising of the patient's head as soon as returned to bed, will give a quiet and natural awakening from the anesthetic.

DISCUSSION.

Dr. Francis R. Packard confined his remarks to a brief outline of the method employed at the Pennsylvania Hospital in Philadelphia, a method very generally employed in the hospitals throughout the city.

The vast majority prefer ether as the anesthetic agent, in combination with some other drug, usually ethyl chloride. The anesthetic is begun with ethyl chlorid, and switched to the other, with Dr. Gwathmey's, or some other similar apparatus. He had used the Rupert apparatus.

The anesthetic is given by a trained woman anesthetist. The position which he prefers, and which most of his colleagues prefer, is the recumbent, with a sand pillow under the head and shoulders. The secret of the anesthetic depends upon the skill of the anesthetist, who gives most successfully the agent to which he is most accustomed. The old method in most hospitals was to have the resident interne give the anesthetic, a custom which was responsible for more disasters than is generally realized. The giving of an anesthetic to a patient about to be operated upon for the removal of tonsils or adenoids is too serious to be entrusted to one just out of college.

Disasters in the giving of anesthetics often occur as the result of the improper preparation of the patient before the operation. He cited two cases in his own practice which illustrated this point, each of the patients having eaten a full meal and consequently nearly asphyxiated during their anesthesia.

Dr. Joseph A. White said the choice in anesthetics is generally given to chloroform in the South, though there is now a tendency to give ether or ether mixed with chloroform, as suggested by Dr. Gwathmey. This is more especially the case since the old, cumbersome methods of giving ether have been discarded. Probably we do not credit the anesthetic with all the fatalities that might be traced to this source. Deaths occurring four or five days after the operation are usually attributed to the operation, or to the patient's inability to recuperate, whereas many such cases are directly caused by the effects produced upon the patient's system by the anesthetic, and therefore should be attributed to the anesthetic.

In doing operations about the face and mouth it is desirable to eliminate all apparatus, as well as the anesthetic. In such cases rectal anesthesia is advantageous, and should come more into favor than it is at present. The anesthesia is begun by mouth and continued by the rectum. Notwithstanding the fact that the anesthet-

ist cannot watch the reflexes, it is not as dangerous as pulmonary anesthesia. Moeover, there is no necessity for any complicated apparatus, an ordinary, wide-mouthed bottle will suffice, fitted with a cork having two holes, with two glass tubes bent at right angles, to one of which a small hand-ball is attached, and to the other the rectal tube. This is half filled with ether and placed in a vessel of hot water, because the vapor should be warm and the hot water makes it evaporate more readily. It is not necessary to put the rectal tube very far into the bowel, from four to six inches is sufficient. The anesthetist places one hand over the sigmoid flexure to keep track of the amount of tympanites, and uses the other to force the vapor into the bowel. If the abdomen should become too much distended, it is only necessary to separate the rectal tube from the bottle, and by pressure upon the abdomen the gas is allowed to escape and the tube is then reconnected. The preparation of the patient beforehand consists in giving a brisk purge the day before, and two highly soaped enemata two hours before the operation. If there is much gas, a soda enema may be administered. To get rid of the peristaltic action, a small dose of morphia or hyscin may be given.

Dr. J. A. Stucky emphasized the importance of the point Dr. Gwathmey made with reference to the quantity of the anesthetic used in the mastoid operation. The majority of operators had been in the habit of using perhaps four or five times as much as is necessary. After the first stage of the operation, practically no anesthetic is required. In doing the radical mastoid operation, if the surgeon will clean out the middle-ear first, instead of last, it will be possible to decrease the quantity of anesthetic one-half. Many slow recoveries and much of the so-called shock is due to improperly conducted anesthesia.

Rectal anesthesia undoubtedly has a place in surgery, but the esthetic objection to the method must be overcome. It is not necessary to introduce the tube far, four or five inches being sufficient. He had found morphin and hyoscin beneficial in a number of cases.

Dr. Gwathmey, in closing the discussion, said, the surgeon who insists upon the use of any particular anesthetic, no matter what it may be, more or less handicaps the patient. In many cases contingencies are apt to arise which neither the surgeon nor the anesthetist can anticipate, and the anesthetic must be varied in whatever manner the exigencies of the case may demand.

Referring to the use of chloroform in the South, Dr. Gwathmey called attention to the fact that he was one of the first to show

that chloroform is safer in the South than in the North, and to establish the reason for this by laboratory experimentation. He had found that it requires twice as much warm chloroform to kill an animal as it takes of cold chloroform to accomplish the same end. In giving chloroform warm, the vapor tension is decreased, making it almost impossible to give an overdose. The warm vapor is inhaled and exhaled with greater rapidity than is the cold vapor. For this reason it is safer to give chloroform in a warm climate than in a cold, and in the summer than in the winter.

He considered Sutton's apparatus for giving rectal anesthesia the best. It has a mercurial manometer attached and so arranged that if the tension goes beyond a certain point, a valve lets out the surplus gas, making it impossible to get over-distension. The apparatus is also supplied with a thermometer for regulating the temperature of the ether. The ether should go in at a temperature of 98° or 99°, and no higher.

If water is not available for the section-apparatus, the electrical pump may be used, but the speaker prefers the water pump because it is simple and does not get out of order. Air suction is preferable to either water or electricity.

DISCUSSION.

DR. FRANK ALLPORT said that he had seen so many cases of atypical mastoid diseases that he sometimes wondered if there were any really typical cases. One of the most interesting and important points suggested by this series of papers is the frequency with which one encounters cases of mastoiditis which present very few of those characteristic symptoms which we are led to believe are dependable operative signs. He referred to those cases in which there is no drooping of the meatal wall, no mastoid tenderness, no swelling, no temperature and in which the blood-count is not significant.

He has not had much experience with X-ray diagnosis, but believes that it holds great promise for the future, as soon as better pictures are made and we acquire the ability to interpret the significance of such pictures.

As a rule, diagnosis must be made from the general picture presented by the patient, everything being taken into consideration; and it should always be borne in mind, as Dr. Stucky has so aptly stated, that one cannot afford to maintain a hesitating policy. He had never seen a case harmed by a simple mastoid operation, but he had seen many lamentable results follow the tardy performance of the operation.

He did not know what Dr. Stucky meant by exploratory operation. He did not see how one could very well explore the mastoid cavity without performing an actual mastoid operation. He presumed that Dr. Stucky meant that the operation should be performed along classical lines and then the interior of the bone examined in the search for pathological conditions. He remembered a case reported by him some years ago, in which the patient complained of sudden and severe pain in the mastoid bone. The physician requested that the mastoid be opened, but Dr. Allport could not see his way clear to the performance of the operation at that time. He believed it to be a case of neuralgia and advised appropriate treatment. There was no swelling over the mastoid, no tenderness, no drooping of the meatal wall, no perforation of the drum-head, a perfectly normal appearing drum-head, there was no temperature and the blood-count was not significant. Nevertheless, the patient passed a miserable summer, and finally returned again in the fall with request from the family physician that the mastoid be opened. Dr. Allport reluctantly consented to open the mastoid, and declared that he had never seen a more destructive process than in this case. Whether it was a case of primary mastoiditis or not, he did not know. In fact, he could not say positively from his own experience that there were any real cases of primary mastoiditis, although he presumed from the writings of other men, that such cases must exist. This patient positively asserted that she had never in her life had earache or discharge from her ear, and the appearance of her drum-head certainly bore out this statement.

Dr. Allport cited another case of what appeared to be primary mastoiditis in a child six months of age. There was no discernable signs of middle-ear disease and no history of such a disease, and yet the child had a distinct mastoiditis. Still he felt that possibly a middle-ear abscess might have existed for a few days and the parents who were ignorant might not have noticed it.

Dr. Allport was inclined to think that the cases of mastoidalgia mentioned by Dr. Harris were very rare. He remembered seeing such a case a year or so ago in an old maid of neurotic disposition, who consulted him for intense pain in the mastoid process. This was the only symptom she had. The mastoid bone was opened for relief of the pain. No disease was found, but the bone was extremely sclerotic. The operation affected a cure. We did not know whether there was nerve-compression caused by the sclerosed bone, but in all events the patient was cured by the operation and has not

complained since. He believes that one is justified in opening the mastoid in cases of persistent pain in that region, even in the absence of other symptoms, as no harm can come from a properly performed mastoid operation.

Dr. Ewing W. Day said the fact that no symptoms are present at the time the patient is examined does not signify that there were none previously. If it were possible to follow a case from the beginning, symptoms would probably be found at some time in the course of the disease. In this class of cases when the mastoid is opened, the disease is found to have extended to the dura. The very fact that it has extended to the dura accounts for the absence of pressure and symptoms at the time the patient presents himself. These are the most dangerous cases.

He had never been able to derive any information from the blood-count in mastoiditis limited to the bone. The effect upon the blood-stream from bone-absorption is almost nil in such cases, and when the blood-stream is affected, the disease has progressed beyond the mastoid.

He has had X-ray pictures made in several cases, but, whether due to fault in the plates or in his inability to read them, they had been of no assistance to him.

Dr. S. J. Kopetzky held that in classifying these cases as atypical mastoiditis, if one excludes those so classed because of a strictly anatomical basis, and considers the rest of these cases from the clinical standpoint, one will find symptoms commonly present in each group and significant for each clinical group. For example, the atypical mastoidites caused by an infection of the pneumococcus show an invasion which subsides in one portion of the invaded area only to light up later in another section. The middle-ear may be entirely normal by the time the lesion is evident in the mastoid process proper. This is atypical of the general run of mastoidites, but it is typical enough for a pneumococcus invasion of the middle-ear spaces. Other examples of groups of cases acting alike under similar conditions of infection might be cited to substantiate this contention.

Regarding the case cited by Dr. Barnhill, the character of the invading organism is not given, and so one cannot say whether or not the case presented data characteristic of a class to which it might have been found to belong.

In regard to the cases of so-called "latent mastoiditis," it would be of moment to study what takes place in the cases of mastoiditis in which resolution occurs. Dr. Barnhill says his case was one of

latent mastoiditis of seven years' standing. The speaker doubts the latency of the disease for such a period, and called attention to the following: In the first place, in cases clinically nothing more than purulent otitis media, it has been observed that the cells in the mastoid process are filled to a lesser or greater extent with pus. This is so even when there are absolutely no signs of mastoiditis present. Furthermore, in cases of fully developed mastoiditis giving classical symptoms and in which resolution takes place (as it often does), the tympanic cavity eventually becomes dry, the drum healing; the changes taking place within the cortex are of moment in this discussion. The bony inter-cellular walls which are in part destroyed are not reformed. The disintegrated mass becomes partly absorbed and mostly organized by the growth of blood-vessels and connective tissue. The case is then cured, and the patient cannot be said to have latent mastoiditis. In this given case, the patient is in a similar status to the one upon whom a simple mastoidectomy had been performed and the wound in the mastoid process had become filled up with granulation tissue and the skin and periosteum had grown over and covered the wound-area. An invasion by micro-organisms, seven years later, might in all the above examples or in any one of the incidences, set up an acute infection of the middle-ear spaces and produce a profound disintegration of the granulation connective tissue in the mastoid process. In the resolved case it is no more the manifest stage of a long-drawn-out latent mastoiditis than it is in the breaking down of the wound area in the case operated. To the speaker's mind, the latency of Dr. Barnhill's case bespeaks resolution and seven years later there was an acute infection with resultant acute mastoiditis.

Dr. Kopetzky did not believe that suggestion had so much to do with affording the relief where operation was undertaken in cases of mastoidalgia, nor did he believe mastoidalgia to come within the classification of atypical mastoiditis. He thought the relief was obtained because the nerves in the periosteum were severed during the operation, and suggested that in such cases operative procedures might be limited to incision and retraction of the periosteum where there was no pus in the mastoid process.

Dr. Kopetzky, replying to Dr. Beck, said that since Dr. Beck questioned his statements, he took the liberty of placing the factors upon which they were based before the meeting.

That pus invades all the cells of the mastoid process in cases which we are habitually diagnosing as acute otitis media purulenta

from the clinical standpoint, is borne out by the investigations of Politzer and Bezold, and especially by the work of Benninghaus. Radiograms of such cases which give no mastoid symptoms at all, and which are in no sense to be considered as mastoid cases, show when compared with radiograms of the opposite ear, the distinct general cloudiness which interpreted means pus within the cells. In the other cases, according to Bezold, in nine per cent of the cases, the bone of the mastoid process becomes involved in a destructive process which Boenninghaus has termed an "ostitis rarefi-cans simplex."

The destruction of the walls separating the cells within the mastoid process, and the changes which occur after resolution sets in whereby the larger spaces caused by this bone-absorption is filled in with granulation tissue was described in 1904 by Scheibe.

Boenninghaus, citing Scheibe, states that while some bony deposits may follow in the usual way from osteoblasts, this is only a very limited process. The radiograms of acute mastoiditis, and the study of the pathologic findings on the operating-table further substantiate these observations and contentions.

Dr. Walter A. Wells mentioned the case of a physician who was visiting another physician in Washington, and who had been having some indefinite trouble with his ear. Though the trouble had existed six weeks, there had never been any sign of suppuration, no pain, except at the commencement, no severe headache. He had been under the care of several physicians in New York and elsewhere, but no one had suggested a mastoid involvement. When the speaker first saw the patient there were beginning to appear symptoms over the mastoid process. He could hear at ten or twelve inches a watch that ordinarily he could hear at thirty inches. As the drum-membrane looked suspicious, paracentesis was made, but no pus appeared. In a day or two there was a little discharge, which proved to be staphylococcus, with a few chains of streptococcus. With the appearance of the discharge the edematous condition over the mastoid disappeared. The physician whom the patient was visiting discouraged operation. The speaker operated, however, and found the mastoid tip absolutely rotten. The cortex covering the antrum was very thick, but the entire tip was broken down completely. The patient had lost ten or fifteen pounds, and was extremely prostrated before operation. This prostration will often guide one to a considerable extent in deciding whether to operate

Dr. Max A. Goldstein said there had been many references to atypical cases in which there was dearth of symptoms, and in which

destruction proved to be extensive. He presumed that if these cases had been examined bacteriologically they would have been found to be tubercular. He had reported three cases in which tubercle bacilli were demonstrated in the pus and granulations. The bacillus tuberculosis, the bacillus mucosus, or some other slow-working bacillus, is undoubtedly present in that class of cases which are so atypical in variety.

DR. STUCKY, in closing the discussion, said he had seen two cases of atypical mastoiditis in children under two years of age, in which there were absolutely no symptoms at all until the patient had convulsions. There was a little bulging behind the ear in one case which, when opened, proved to be an epidural abscess.

He had reported one case of traumatic mastoiditis. He had also had tubercular cases, in which there were tuberculous glands behind the ear, with no history of middle-ear disease.

The exploratory operation, which Dr. Allport did not understand, meant the same thing to the otologist who opens the mastoid as to the abdominal surgeon who opens the abdomen.

He would have been glad if Dr. Leland had accounted for the nocturnal pains to which he referred.

He did not agree with Dr. Day in reference to absorption. If the abscess is walled off there may be no absorption, but a blood-count taken twice daily will give indication of trouble.

(To be Continued).

A Case of "Papilloma Durum" of the Frontal Sinus. GOTTHOLD HERXHEIMER, *Ztschr. f. Laryngol., Rhinol. u. ihre Grenzgeb.*, Bd. 4, Heft 3, 1911.

In reviewing the literature, the author finds thirty-eight cases of papilloma durum of the nose; they are cauliflower-like villous tumors lined with pavement-epithelium. His case is unique both as to its location (frontal sinus) and as to its microscopical appearance. The tumor consists of connective tissue and epithelium, both being distinctly separated from each other. The surface-epithelium, on account of local conditions, had assumed the shape but not the structure of pavement-epithelium (pseudo-metaplasia) and proved to be ciliated cylindrical epithelium in places where there was no pressure upon it. The author designates the tumor as "fibro-epithelioma papillare cylindrocellulare." GLOGAU.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, April 18, 1911.

C. M. ROBERTSON, M. D., CHAIRMAN.

Large Lipoma of the Laryngo-Pharynx: Removal Extra-orally Under Cocaine. By ELMER L. KENYON, M. D.

The tumor occurred in a young woman of 27 years. It reached from below the tip of the epiglottis to a point opposite the base of the uvula, and filled a very large part of the laryngo-pharyngeal space. After careful diagnostic study it was decided to remove the growth in the manner least dangerous and most comfortable to the patient. Under cocain the tumor was carefully shelled out through a long incision through the mucous membrane over the tumor, without great difficulty and with perfect success. A very marked increase in weight followed.

DISCUSSION.

DR. HOLINGER: Judging from the size of the tumor which Dr. Kenyon just demonstrated it seems almost impossible that the patient was able to breathe, since the swelling was certainly large enough to fill an ordinary pharynx completely. Several years ago Dr. Holinger reported before this society an observation of a still larger tumor that proved to be a very soft and very movable sarcoma, which, when the patient opened her mouth, left only a narrow air-passage on one side. She could not keep her mouth open more than a few seconds at a time for lack of air. When she closed it she would make several motions of swallowing, thus pushing the tumor into the naso-pharynx. Afterwards she breathed quietly, but as soon as she opened her mouth wide the tumor fell down into the oro-pharynx. In the removal a tracheotomy had to be performed. Recovery was uneventful.

Removal of Scissors-blade from the Ear Three Years and Three Months After its Introduction. By OTTO J. STEIN, M. D.

Original contribution to THE LARYNGOSCOPE, *p. 699, June, 1911.*

DISCUSSION.

DR. JOSEPH BECK, in discussion, said that he was the physician at the Cook County Hospital whom Dr. Stein referred to in his report.

The man came under his service at the hospital about one year before, with the following history and findings: While walking by an alley one night, in an intoxicated condition, a man jumped out and struck him a blow with a knife on the side of his head, knocking him down. On examination three days later, Dr. Beck found an external wound, about half an inch wide, just below the zygoma, in front of the tragus. From the external ear there was a discharge of pus which, after being washed out, disclosed a dark body that sounded metallic to the touch of a probe. No tenderness over the mastoid. Not much effect on the hearing. The one remarkable fact was the absence of some facial paralysis or salivary discharge from the external wound since the direction of the passage of the then suspected knife-blade appeared to be right through the parotid gland. An X-ray picture was taken and this showed a knife-blade, but of a very peculiarly shaped point, as though it were blunt. Dr. Beck decided to remove this foreign body under general anesthesia by going behind the ear, and it was necessary to chisel off some of the mastoid process, since the blade had gone into the bone. On liberating the blade it was found that the explanation of the blunt end of the knife-blade was that the tip was broken and turned under the main portion of the blade. On removing the two portions of the knife-blade no evidence of anything else foreign was found, but after hearing the report of Dr. Stein, this evening, Dr. Beck believes that more careful examination would have disclosed the second portion of the scissors. In view of the history and the rarity of the employment of scissors as instruments of attack, he was satisfied with the knife-blade, especially after he explained the peculiar shape of it by the small second piece of point. The patient left without permission on the following day, and Dr. Beck heard nothing more of him until Dr. Stein told him personally of the case.

There are several points of interest about this case. First, the interpretation of the radiogram in showing the blunt end of the knife. The reason that the second blade did not show is that it was very likely just below the one Dr. Beck removed, and they both showed as one blade. A more important point is the question of malpractice in cases in private practice particularly. Dr. Beck has inquired about it and found that since the patient left without permission before he was discharged he assumed all the responsibility of complications or failure. Another X-ray picture subsequent to the operation, and re-examination of the ear, would have disclosed the foreign body.

The Inferior Turbinate: Its Longitudinal Resection for Chronic Intumescence. By Otto Freer, M. D.

Original contribution to The Laryngoscope, *p. 1136. Dec.*, 1911.

DISCUSSION.

Dr. John E. Rhodes stated that Dr. Freer presented in his usual clear and lucid manner his operation on the inferior turbinated body and he has little to add. The fact is recognized by all that this structure has an important physiological function in moistening and warming the air before it enters the lungs, and any operation should conserve that function to the highest degree possible. It is so easy of access and furnishes such an easy field for operation by many of the methods recommended that Dr. Rhodes would like to sound a note of warning as to the tendency to operate too often when more conservative measures only are indicated. He deprecates this tendency to operate except as a last resort. All have seen cases in which the radical measures in making a free nasal passage have resulted in a condition much worse than the original complaint. A dry, crusty, nasal cavity, dryness of the mucous membrane of the naso-pharynx and pharynx, and an obstinate chronic laryngitis are sometimes the result of these operations. The operation under consideration, because it preserves such a large portion of the mucous membrane and underlying tissues, forming a turbinated body whose physiological function is largely preserved, appeals to Dr. Rhodes and he would certainly favor its substitution for the reckless sawing, cutting and tearing operations by cutting-forceps that are largely in vogue.

From his own experience of twenty-five years, Dr. Rhodes does not hesitate to select the galvano-cautery or cauterization by chromic acid in suitable cases. While he uses them possibly less frequently than formerly, he has seen too many excellent results in selected cases to think of discarding them altogether. They can be accurately applied in these hypertrophic cases in definite areas, and there need be little or no subsequent scabbing or discomfort where linear cauterizations are made, and the narrow cicatricial line adequately controls the swelling and interferes very little with the normal function of the tissues. With hypertrophy of the bone, of course, this form of treatment would be inadequate and the operation described by Dr. Freer is quite ideal. In other cases of marked nasal obstruction such as he has described, it would also be the operation advised. Dr. Rhodes has had some difficulty in operating by this method in lifting the closely adherent membrane from the surface of the irregular nodulated body of the turbinate, especially where previous cauterization had been done. The difficulty of dis-

engaging the posterior end, which Dr. Freer speaks of, is also one that some other form of instrument might overcome. A guillotine slipped over the forceps holding the fragment, or the wire snare, suggests itself as a possible solution of the problem. Dr. Rhodes wishes this operation to displace largely some of the other reckless methods to which he has referred.

Dr. Joseph C. Beck stated that this operative procedure appeals very much to him because it is strictly surgical, sufficiently radical and still conserves the physiological function of the inferior turbinal. Particularly the preservation of the mucous membrane flap which covers the denuded bone is very prettily demonstrated by the author. To that point Dr. Yankauer has contributed a great deal in his suggestion to suture the dissected mucous membrane in resecting the hypertrophied inferior turbinal. There are several statements that the author made in reference to the pathology that Dr. Beck wishes to take issue with. He speaks of the hypertrophy and says it is due to the lymphoid tissue overgrowth, in contra-distinction to the condition he is describing to-night, namely, the turgescent or vaso-motor disturbance. As a matter of fact, in hypertrophic rhinitis it is usually an inflammatory condition, with hypertrophy of all or any of the various component structures of the turbinate, as, for instance, we can have hypertrophy of the epithelium covering the turbinal, or the mucous glands may be increased, the bone and the loose areolar tissues may be increased in size as well as numerically, —that is, hyperplasia. Again, the vessels may be hypertrophied and increased in number,—and we can and frequently do have hypertrophy or hyperplasia with turgescence in the same inferior turbinal. Dr. Beck has demonstrated this repeatedly himself in making histological examinations of tissue removed in the partial turbinectomies and in this connection he would like to ask Dr. Freer if he has made any investigation along this line in the many turbinal operations he has done by this method since that would add considerably to the subject.

Dr. Edwin Pynchon: Enlargements of the inferior turbinal may in a general way be divided in two classes: those in which there is a chronic hypertrophy or relaxation of the soft tissue, and those in which the bony framework is of too great size. In the latter case the soft tissue may be practically normal. In either case respiration may be obstructed or drainage made defective.

Bony enlargement of this turbinal may be due to either a general thickening of the bone or, as more frequently occurs, to an increase in size of the bony scroll which may extend downward too near the

nasal floor, causing defect in drainage, or outward from its attachment so as to be too near the septum thereby obstructing respiration. In other cases the scroll may be so large as to be defective in both of these described ways. Bony enlargement of this turbinal is generally limited to the anterior three-fifths of the body.

For correction of this defect, when the enlarged scroll extends downward too near the floor, Dr. C. R. Holmes originated a method of procedure whereby, with a delicate saw introduced above the bottom of the scroll, a sufficient section is removed to insure good drainage. In this way great benefit has been secured, particularly in cases in which tinnitus and deafness were observed. By this operation as described, complete relief is obtained in a large number of cases, though when the upper portion of the bony scroll is too near the septum some obstruction to respiration will continue if a further step be not taken. For this purpose, after removal of the lower portion of the scroll, as suggested by Dr. Holmes, Dr. Pynchon has designed a small saw with a convex blade wherewith, by sawing from below upward, the bone is severed without injury to the soft tissue above, and in this way the remaining portion of the body is caused to drop away from the septum. By the use of tampons to retain it in its new position the severed bone reunites and both the obstruction to respiration and drainage are corrected. Dr. Pynchon has previously described this method of operation whereby a permanent correction of this trouble is secured.

Enlargements of the soft tissues, wherein the bone is not involved, are best corrected by incising a sufficient section, as suggested by Dr. Freer in his paper, so that after healing the passage will be sufficiently roomy. The galvano-cautery can also be employed, and when the posterior end of the bone is too large the hot snare is the best method of treatment.

Dr. Elmer L. Kenyon: It is not easy to realize the whole significance of the procedure just described by Dr Freer. He is to be congratulated upon opening up so suggestive a field, but much experience will be required to determine just what may be expected of the method. He has shown us that the mucous membrane can be elevated from the bone of the lower turbinate over a large area and that this must be accomplished by sharp rather than by blunt dissection. The second step in his procedure is the cutting away of the lower edge of the denuded lower turbinate bone. Evidently these are two quite distinct procedures, since the operation on the bone could not well influence the result upon the intumescence of the superior portion of the turbinate body, which we are given to

understand is corrected quite as completely as the intumescence of the lower part. The first thing to be determined would seem to be the effect of simply elevating the mucous membrane without incising it and without removal of any part of the bone itself. Knowing how far the chronic vaso-motor dilatation would be corrected from such a procedure alone, one would be in a position to realize exactly the further effect of incision of the mucous membrane and removal of bone in addition.

In instances of chronic intumescence, certainly very common, in which the turbinate bone is far from being too short but in which the lower meatus is filled by intumescence, one would fear that incision of the bone with correction also of the intumescence might easily result in an excessively large breathing space.

The cautery has a great advantage in enabling the operator to place and adapt his operative procedure exactly to the degree and place of vaso-motor disturbance. Especially is this so where a certain amount of hypertrophy accompanies the intumescence, a common occurrence. Whether the new procedure could be so well adapted to the variations remains for experience to determine. Widely varying degrees of tendency to dilatation exist in different cases and therefore the same procedure for all cases, as seems to be contemplated by this paper, does not seem rational.

Moreover, what the ultimate effect of extensive denudation of the turbinate bone upon the physiologic capability of swelling and contracting of the mucous membrane might be remains to be determined. For this physiologic capability has to do, probably in an important way, with the infiltrating and warming functions of the nose, under conditions producing irritation of the nasal mucosa, and should by no means be too greatly interfered with. Thus are opened up questions all of which require to be studied before this interesting procedure can take its place with certainty in rhinology. Dr. Kenyon thinks Dr. Freer is to be congratulated for thus stimulating this new field of inquiry and he will gladly try the method.

Dr. Otto Freer (closing discussion:) Dr. Freer found the favorable comment of Drs. Rhodes, Beck, Kenyon and Wilson most gratifying. The easiest part of the operation is the elevation of the mucosa of the convexity of the turbinate. The accurate division of the flap along the lower border is more difficult. The tendency is to place this cut too high and so to make too narrow a flap, or else to buttonhole the mucosa half way back and so sacrifice the posterior half of the flap. The first operations are necessarily crude. but experience will improve the work and mis-steps are not fraught

with such serious consequences as in the case of septum operations.

Dr. Rhodes very properly emphasized the uncertainties of the cautery and its use has certainly become very limited. Dr. Freer did not think that the probing mentioned by Dr. Sonnenschein as a Vienna method would be as effective as the cautery, even if the impossible were possible and a probe could be made to travel under the toughly adherent mucosa-periosteum. Only a sharp blade can do this.

In regard to the Kirstein lamp, Dr. Freer finds it indispensable for accurate intra-nasal work and regards the crossed filament light of Brunings as far superior to any yet devised for deep illumination. It takes the place of the regular Kirstein miniature lamp.

Dr. Freer agreed with Dr. Pynchon's view that chronic intumescence of the posterior end of the inferior turbinate was a cause of Eustachian obstruction, the reason probably being that the congestion of the mucous membrane extends backward and into the lumen of the Eustachian tube, which lies close to the turbinate. Dr. Freer has seen such Eustachian obstructions disappear after resection of the inferior turbinated body.

The objection to the saw for the removal of the bone is the fact that its distal end punches into the region of the Eustachian tube at every thrust and that, in such a narrow cavity as the nose, it is an inaccurate instrument which can only cut in a straight line, causes a great deal of pain, especially if it stick in its course, and must be jerked free. It is also apt to tear the flap. The chisel is much better adapted to the task.

In regard to Dr. Beck's question concerning a histologic examination of the portion of the turbinated bodies removed, Dr. Freer had not had time to make this but he felt satisfied that the close retraction of the mucous membrane to the bone produced by adrenalin was proof that the swelling, in all but a small minority of the cases seen by him, was simply due to a vaso-motor dilatation of the cavernous veins of the turbinate. Dr. Beck's remarks suggested an interesting pathological research for anyone wishing to make a study of the changes found in hypertrophy and intumescence.

Dr. Freer replied to the question of Dr. Eugene R. Lewis regarding the surface to which the flap adheres in healing, that the cut surface of the bone and the cut surface of the outer covering of the turbinate form a raw surface broad enough for the attachment of the flap, which curls around the bony stump and forms a smooth border for the reduced turbinate.

To be continued.